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AIR FOOD AND EXERCISES.

AN ESSAY ON THE PREDISPOSING CAUSES OF DISEASE.

BY A RABAGLIATI

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AN ESSAY ON THE PREDISPOSING CAUSES OF DISEASE.

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"How little does Heredity count as compared with Conditions."—*Henry George.*

"People shelter their own Sins under Accusation of their Race."—*John Ruskin.*

PREFACE.

The papers which form the basis of the following short essay originally appeared, for the most part, in *The Scalpel*, during the year 1896. They have been much amplified, and could indeed easily be amplified still more, as they probably will be if the essay is received with any favour. The difficulty has been not to say but to refrain from saying all that the writer thought on a subject he feels to be, if not the most important, the most important but one with which humanity can interest itself. The main proposition elucidated in the essay may be said to be this: that there are three chief predisposing causes of Disease, as there are, conversely, three chief predisposing causes of Health; and that these are Air, Food, and Exercises. In other words it may in the main be said to be, that proper relations between the human organism (and no doubt other organisms also, though these are not now in question) and Air, Food, and Exercises, give as their resultant Health; while improper relations between the human organism and Air, Food, and Exercises, result in Disease. Of these three sets of causes, far the most important, in the writer's view is Food. This opinion is of course not peculiar to the writer, many medical authorities having, from time to time, stated substantially the same view. But many authorities who might perhaps agree with him in his main proposition, so long as it remained an abstract one, might refuse their assent if the general statement were translated into the concrete and particular. How the writer has been forced to the adoption of his general view and to its translation into detail, will be more or less evident according to the interest and attention which the reader may care to bring to the study of the essay itself.

As a corollary to the main proposition regarding the predisposing causes of disease, arises the opinion, that if the organism is properly managed as regards these, then the exciting causes of disease need not give us much trouble or concern. The exciting causes of disease are such causes as cold, heat, rain, damp, drought, storm, wind, fatigue, the unavoidable anxiety of life, and the microbes which we fear so much and against which we are being advised to take precautions so elaborate that, in the words of a recent French writer, their very ghost or spectre seems to haunt us. Certainly the discovery of these last seems to have added a new terror to life. Of course, in excess, some of these exciting causes, it would be impossible to withstand and live. A fatigued man who should fall asleep in the snows of Mont Blanc without any covering would probably never wake again, however well he had managed himself as regards Air, Food, and Exercises. But even in these circumstances his resistance would be greater had he been properly fed, than if his blood had previously been for long loaded with digestive waste. And similarly with the effects of violence. An injury inflicted on a healthy man would have far less effect than the same amount of violence inflicted on a man improperly fed, and in a generally unhealthy state of body. The former would behave like the trained and drilled and properly fed soldier, of whom it has been well said that "he takes a great deal of killing"; while the latter would probably succumb to a much less amount of violence than the other would easily throw off. But, while no doubt a sufficient amount and intensity of the exciting causes of disease might be acting, as would kill or make ill any man, still the corollary is, that, when men and women are properly managed, the ordinary exciting causes experienced in daily life, will exert little or no effect on them. And if they are made ill for a time, the illness will probably be slight. This the writer also believes to be true as to germs and microbes. We must all be under the continual influence of these, for they appear to be almost omnipresent. When in good health we oxidise them off, and suffer nothing. It is only when we are ill, or it is at least mainly when we are ill, that is, when we are mismanaging ourselves as regards

Air, Food, and Exercises, that they have power to hurt us. Or at least, as is shewn in the essay, one of the two factors in the case is determined by our state of health, the other being the infecting organisms themselves.

It is not denied that there is a fourth predisposing cause of disease, viz.:—Heredity; but gradually, perhaps very gradually, the writer has been driven by the evidence to conclude that heredity counts for very little as a predisposing cause of disease and of health, among adults at least, if not even among persons who have passed the tender years of early childhood. If ten per cent. of the diseases for which medical men are consulted may be ascribed to heredity, the writer thinks that this is an outside estimate. But if ten per cent. of such diseases are due to heredity, then ninety per cent. of them are acquired. If the writer's real opinion were asked for, he would be disposed to say that probably five per cent. would be a fairer estimate for the hereditary diseases incident to adult humanity than even ten. The exact proportion, however, does not much concern him. He sees well enough that a controversy almost interminable might be raised on this question, and that a long and no doubt most interesting, and even fascinating investigation would have to be entered on before the question was settled. If time and opportunity are given to him he may even be tempted to attempt to add something to this interesting inquiry. But at present he is content to say that the large, the very large, proportion of the ailments of adult humanity are acquired. Heredity seems to determine organisation, and such considerations as initial resistance. But resistance at any moment subsequent to the moment of birth seems to be, if not entirely, then for the most part acquired. How far the views propounded in the essay will be accepted remains to be seen. Some may think them reasonable, or reasonable in the main. Others probably will not. The preconceptions of readers and thinkers regarding heredity will be to some extent a determining factor of their judgment on this point. For his own part, the writer is unfeignedly thankful that he has been able to free himself somewhat from the trammels of the opinion that heredity is a great cause of the diseases of adult life, or of what for brevity may be called adult disease So vastly different has his standpoint become, that whereas formerly he thought (under the domination, as it now seems to him, of received opinion) that heredity was a most important factor in the determination of adult disease, he now thinks it is a very small one indeed. He is disposed, indeed, to go so far as to say that a medical man who should be allowed a free hand and who should have handed over to his care 1000 children of 5 years of age carefully selected from dyspeptic, anæmic, consumptive, rheumatic, eczematous, gouty, influenzal, bronchitic, pneumonic, varicose, erysipelatous, apoplectic, diabetic, and carcinomatous parents, would be able to rear as many of them, or as many within from 5 to 10 per cent., as he could of 1000 children of the same age carefully selected from what are supposed to be healthy parents. He does not know if in the present state of medical opinion this view will be considered outrageous or not. It is very difficult to find out what is the state of medical opinion on this question. When in daily life such a view has been propounded to the laity they have generally appeared staggered by it, and hence unwilling to accept it. The laity receive their views on this question, to some extent, no doubt, from their own observation, but still more from the medical profession. On the occurrence of serious and chronic illness, the medical man consulted almost invariably makes careful and even minute inquiry (among other things) into the family history of the patient. If the case be one of consumption, gout, or cancer, *e.g.*, the medical adviser seems to attach the greatest importance to the question whether other cases of a like nature have been known in the family. No wonder, therefore, if the non-medical public follow the lead of the experts. But the medical friends to whom the writer has propounded his views on this question of the effects of heredity in the transmission of disease have also, as a rule, seemed to think the proportions of children rearable, if the comparative experiment above suggested could be made, would vary more than the writer does. It would be exceedingly interesting, and even of the utmost possible importance, to have such a challenge accepted and its terms put to the test. It would not, perhaps, be very easy to have the challenge accepted; only the State or a large municipality could do it. But it has seemed to the writer sometimes that material for at least one group of the children in question might, perhaps, be found from among those born in large workhouses. The more the writer thinks about the question, and the further his experience extends into what is thought to be, or what is called hereditary disease, the more confirmed does he become in his view. He has not found, *e.g.*, hereditary headaches, that is, headaches in the sons or daughters of men or women who suffered in that way—he has not found such hereditary headaches more difficult to treat than headaches occurring in those whose parents did not suffer in such ways. He has been able to cure such headaches in the children of those who, for want of proper treatment, were allowed to carry them to their graves. As to consumption and cancer, the two diseases that in common opinion are associated with hereditary transmission, he believes that a complete answer can be given. In the case of consumption the answer has been given in the essay. The experience of the army and of other large bodies of men does not appear compatible with the view that consumption is a hereditary disease, while it is wholly compatible with the view that it is acquired. As to cancer, he does not know whether in medical opinion, cancer is considered to be a hereditary disease. To attempt therefore to prove that it is not, might be like first erecting a man of straw and then knocking him down. But if the views advanced in the essay are correct, and if cancer is mainly a food-disease, then it is not necessary to assume that it is hereditary; or at all events it is not necessary to assume that cancer will be more likely to occur in a daughter because her mother unfortunately died of it. The age of five years has been mentioned as the age of selection of the children in the challenge above mentioned. That is because, in the writer's view, if disease is inherited, or in the comparatively few cases in which it certainly is inherited, the disease has generally either been grown out of, or it has destroyed the affected life by that time. Would he accept the challenge and be willing to carry out the experiment if the children were handed to him at birth? Well; he does not think that such a condition need compel him to increase his margin of difference by more certainly than five per cent. He does not in fact think it would be so much; and he would feel quite confident, that if he were granted a total margin of 10 or 12 per cent., even at birth, he would be able to win the challenge. The opinions which we hold are determined by a large number of experiences extending over the length of time during which the subjects in question have been considered. In proportion to the extent of the experience, and still more in proportion to the closeness of the attention which we have been able to bestow on our experience, will be the value of the resultant opinion. It would be for the most part, quite impossible to analyse the various factors, which, in the aggregate go to form an opinion. No memory could carry the details. Only the net result can be given, and everyone will have his own estimate as to the value of this resulting view. For himself the writer can only say that closer inquiry at the oracle of nature, on the part of a mind, so far as he knows, perfectly candid and impartial at the outset, and more extended observation of disease has not made him less hopeful, but, on the contrary, much more hopeful in advising patients. Even if this state of mind should prove to be founded on delusion, he is thankful for an honest belief in a hopeful delusion. Hope is too uncommon, and pessimistic fear is on the other hand too common an attitude of mind, not to be thankful for the existence of the one, nor to rejoice heartily for the disappearance of the other. But he is convinced that it is no delusion, his general experience of practice founded on better views encouraging him every day to believe that, as his vision has become clearer, so his powers of help are greater than they were before. There are many disappointments still; but great as they are, they are fewer than formerly.

And no doubt the management of a delicate and susceptible organisation in his own person has been of much value in teaching the proper treatment of disease; while he believes that it has not diminished his sympathy for the weakly, the sick, or the suffering.

There seem to be many analogies (heightening the belief in the unity of nature, with all that that may mean) between the advice offered by the medical adviser and that offered from a different standpoint by the spiritual pastor and teacher. Not the least of these resemblances is shown in the perfect simplicity of the terms with which each deals. Right and wrong, truth and falsehood, duty, obedience, hope, hate, and love are terms which all can understand, and may fairly be compared in this respect with the Air, Food, and Movements which form the subject matter of medical discourse. The doctrine of original sin is quite comparable with the inquiry into the heredity of disease; and if both seem difficult to understand at first sight, the difficulties seem to get less the more closely they are investigated. There seems to be no evil anywhere which is not due to breach by some one of the laws of nature. And both the spiritual and the medical adviser are at one in asserting that not impulse but duty, not the taking of what we like, but the liking of what is good for us, and moderation in the use of that, is the privilege of humanity; and that without self-government there is and can be no health—

spiritual or physical. Both say to us in so many words, that it is the glory of humanity to keep the body under; and, better is he that ruleth his spirit than he that taketh a city. And if the one says to us that it is futile to make clean the outside of the cup and of the platter, if within they are full of extortion and excess; so the other tells us, or ought to tell us, that if we make sound and healthy the inside of the physical body, then the aggressive surrounding germs will attack us in vain from the outside, since within there is no place or lodgment fit for their habitation and development.

He that would deal with sin aright,
In soul-sick men from morn till night,
Must bring a sympathetic heart
To sin, and in the same have part.

Does hope move the expanding soul,
Or love stretch out to embrace the whole?
Who would guide hope or mould true love,
To hope and love his heart must move.

Even hate contracting, envy green
Must in their colours true be seen;
That envious hate from out the world
May hissing serpent-like be hurled.

And greed of gain, the bane of life,
The cause of sin, the cause of strife—
He knows its tumult, he indeed,
Sole knows its power who conquers greed.

To pain, that writhes the human face—
Pain has in every heart a place—
How shall he bring relief again,
Whose heart has ne'er been wrung by pain?

XVI.

Shall he advise us who is well?
Whose powers no hint of weakness tell?
Or he who, suffering and weak,
Has reached to health? His help we seek.

What strings responsive vibrate clear
To human joys and sorrows here?
Those that in joy and grief and pain
Have thrilled again and yet again.

Ah! ye angelic sinless host,
What should move you to save the lost?
What motion shall compel you spin
And stagger with the weight of sin?

Who wills and will not, falls, aspires,
And reels in conflict of desires,
Of thought, emotion strong and will,
He speaks to men as human still.

Ah! blessed sin: ah! weakness blessed:
By you comes help for those distressed:
Through you men bowed with pain and grief
May hope for comfort, peace, relief.

AIR, FOOD, AND EXERCISES.

Progress of Medicine: in what it really consists.

IN current literature, professional and lay, we are continually being told of the progress of medicine and surgery. I have nothing to say as to the latter, though, perhaps, in the words of a recent writer, "the cry of operate, operate, ought to have (sometimes) been rather diagnose, diagnose." But I do not deny, I rather re-echo the assertion, that when operations are necessary, they are much safer in the performance, and much more curative in their results, than they used to be. Perhaps surgical operations have sometimes been too rashly undertaken. Some authorities think they have; but this is a matter of opinion. But I don't here deal with surgery. As we shall see, its influence on the duration of life has been comparatively small, on the whole, though in individual instances, no doubt, it has been very brilliant in its results. As to medicine, however, what has been the result? Increased length of life? On the average, yes. But in detail and at particular ages, what are the results? They are certainly worth examination; and I fear that he who carefully examines them will not rise from his task so full of the great

Surgery excluded from scope of inquiry.

advances of medicine as he was when he began his inquiry. His song will not be so full of jubilation and triumph as some of us seem to think it. Of course, I know (as who does not?) that while the death-rate of the whole community in England and Wales was 22·33 per 1000 per annum in the years 1838-40, when the Registrar-General first began to compile his statistics, or 22·63 on the average of 1844-5-6, it had fallen to 20·6 per 1000 on the average of the years 1891-3, the last years for which the returns are available. That is no doubt a great advance. Measured in percentages, it means that in fifty years the death-rate has fallen nearly 8 per cent.; or otherwise, we may perhaps say that the average duration of life has increased from 44·2 years to 48·5 years in fifty years. This difference of 4·3 years' increase of life, multiplied into 29,731,100, the estimated population of England and Wales in 1893, means an addition of 127,843,730 years of life to the community in a generation. When we think of numbers like this, we seem to be justified in joining in the song of triumph which resounds on every hand; and I do not say that there is not much to be thankful for, so far as this result goes. This represents the gross sanitary advance in fifty years, what we may call the gross advance, medical and surgical, which characterises the half century. Beside it, even the addition of 30,000 years of life which a great ovariotomist recently claimed that he had made through his own personal instrumentality to the life of his

Diminished Death-rate

Increased length of life since 1838.

day and generation (great as it undoubtedly is as the influence effected by one man, now happily imitated by many others) pales into insignificance. It illustrates the different figures dealt with by medicine and surgery respectively. Where the surgeon speaks of adding thousands of years of life to his generation, the physician (as represented by hygiene and sanitation) speaks of millions. The millions, no doubt, include the thousands, but the total result goes to show that great as the influence of improved surgery has been, it has been comparatively small as compared with that of improved medicine, speaking of it in its widest sense as including sanitation. And further, sanitation is without drawback, while surgery is not. For, in considering the improvement effected by the latter, we are compelled to remember that at least some lives have been shortened, where surgical operations have ended fatally; since it cannot be contended that all the lives cut short by surgical operations would have terminated so soon had the patients been let alone. It will never be possible to estimate to what figures such losses would amount; but, whatever they are, they ought to be deducted from the gross addition made to human life by surgery. I am not, however, about to engage in the task of ungenerously depreciating the beneficent effects of improved surgery, but am merely pointing out that surgery has comparatively small influence on the length of life of the whole community, on the one hand, and that, on the other, surgery is weighted with

Surgery cannot be said to have increased the length of life of whole community.

some unavoidable drawbacks which do not obtain in the domain of sanitation. All that is added to human life by sanitation is pure gain, for I think I need not now and here discuss the question already settled, whether, in saving the weaklings, sanitation can in any sense be said to have deteriorated the race. Assuming that as settled, the question remains in what form has the gain been effected? The gains of the last fifty years, so far as I am able to judge, are mainly two. I speak, of course, of the gains on the large or great scale. We have very much diminished the mortality from the fevers, or what are known as the zymotic diseases, and we have very much diminished the mortality from consumption. In the five years 1850-4, the mortality from the fevers amounted to 5234 per million per annum on the average. In the five years 1875-9 it had fallen to 3911 per million per annum. In 1892 there died from the zymotic diseases in England and Wales 82,099 persons, or at the rate of 2792 per million per annum, out of the estimated population of 29,405,054. In 1893 the death-rate from the zymotic diseases was 3165 per million per annum, a rate higher than that of 1892, but still about 40 per cent. less than that of the quinquennium 1850-4.

Gains of the last 50 or 60 years, two; diminution of Fevers: diminution of Consumption.

In the case of consumption the mortality in the five years 1850-4 was at the rate of 2811 per million per annum. This had fallen to 2130 per million per annum in the five years 1875-9; and in 1893 was at the rate of 1468 per million per annum, a rate identical, it may be observed, with that of 1892. This is a reduction of 47 per cent. in the mortality from consumption, or not very much less than a half; and both in the case of the zymotic diseases and in that of consumption the change must be looked upon as extremely satisfactory.

If now we come to inquire how it is that these gains have been effected, the answer is obvious. These changes are the result of the sanitary efforts of the last generation and of the present. We have expended vast sums in improving (sometimes even in creating) drainage, abolishing cellar-dwellings, diminishing over-crowding, opening up and widening narrow streets, opening public parks and recreation grounds, and generally in efforts to purify the air and abate nuisances; and we have obtained vast benefits as measured by the figures just stated. One of the incidental effects has been very much to benefit life at the earlier ages, and to diminish sickness and mortality during childhood and youth, since the effects of the zymotic diseases and of consumption are mainly felt at early ages, the large majority of cases of these diseases occurring under 25 years of age.

So far as I am able to judge, however, the diminution in the mortality from the fevers and from consumption constitutes the whole of the sanitary gain during the past forty years. If we come to think of it, it will be evident (I fancy this is generally admitted) that the results have been obtained by directing attention to one of the requisites of life, viz., Air. Improving drainage, abolishing cellar-dwellings and over-crowding, widening streets, and providing parks and breathing spaces, mean in one word, purifying the air; and by this means all these gains have been effected.

Attention to Air the cause of these gains.

But besides the effects of providing more and purer air, there is another cause of the diminished general mortality in the United Kingdom which is not sufficiently emphasised. By failing to realise its importance, we erroneously attribute to sanitation effects due to another cause, so exaggerating the importance of sanitation, which, however, requires no fictitious aids to add to its consequence. I refer to the diminution which has taken place, and which appears to be still going on, in the birth-rate. The birth-rate rises and falls under the operation of various causes connected with the prosperity or otherwise of the people; but speaking broadly, the birth-rate in England and Wales was about 35·5 per 1000 persons living fifty years ago, and it is about 30·5 to 31 per 1000 now, a fall of between 12 and 13 per cent. This fall in the birth-rate, however, though applying in a general way to the whole of the United Kingdom, is much more accentuated in some places and in some parts of the country than in others. It is more marked in the West Riding of Yorkshire, *e.g.*, than in London. In Bradford the birth-rate is the lowest, and a good deal the lowest of all the large towns (with populations of 200,000 inhabitants and over) in the United Kingdom, and its birth-rate has been persistently falling for a long time. Thus, in 1881 it was 33 per 1000; in 1885 it was 29; in 1891 it was 28·6; in 1893, 27·6; and in 1894 it was 26·6 per 1000 persons living. In London in 1894 the birth-rate was 30·9; practically the same rate as that of the country generally. The lowest birth-rate of all the large towns of England next to Bradford was in Nottingham, and there the birth-rate was at the rate of 29·4 per 1000. In Bristol it was 29·6, almost as low as Nottingham. In Hull it was 35. Now, why do I refer to this point? Because a low birth-rate implies a low death-rate, and a high birth-rate implies a high death-rate. But as we estimate the good effects of sanitation in accordance with the fall in the death-rate, we may easily overlook the influence which a low birth-rate has in lowering the death-rate. But how, it may be asked, does a low birth-rate lower the death-rate; and how does a high birth-rate increase the death-rate? In this way. Of all the deaths that occur there take place about two-fifths of them under the age of 5 years. We shall see this for the country generally. In Bradford, in 1893, 4632 deaths occurred, and of these 1839, or almost exactly two-fifths, took place under 5 years of age. But 45 per cent. of all the children born into the world die before they are 5 years of age. If, therefore, a smaller number of children are born into the world than formerly (and

Diminished Birth-rate a cause of the diminished Death-rate.

that is the meaning of a low birth-rate), obviously there will be a smaller number of the population living to afford so high a mortality, and therefore the general mortality rate will prove lower, not only because of general improvement in the public health, but also because a smaller proportion of the population are living at what may be termed the very fatal ages. An illustration will make this clear. Suppose a town of 200,000 inhabitants has a birth-rate of 30 per 1000, whereas formerly it had a birth-rate of 35. Obviously, 6000 children will be born where 7000 used to be: that is, 1000 fewer children will be living in that town under the new birth-rate than under the old one during a given year. Now suppose that one-fifth of the children born died under 1 year old (which I regret to say is the rate at which children born in Bradford died in 1893—198 per 1000). Then 1200 children would die as against 1400 had the former birth-rate been maintained. This would reduce the deaths by 200 in a year, or 1 per 1000 per annum in a population of 200,000, a diminution quite sufficiently marked to appear to justify the statement that that town was at a higher level of health than others.

A falling Birth-rate lowers the Zymotic or Fever Death-rate.

Another point. A large proportion of all the cases of fever that occur, happen among children under 5 years of age—a large number of cases of measles, scarlatina, diarrhœa, &c. Now, as under a lower birth-rate, a smaller number of persons susceptible to these ailments are living at a given time, it follows that fewer of these cases will occur, and therefore that a lowered birth-rate lowers not only the general mortality as we have seen, but that it lowers also the zymotic or fever mortality. From these considerations it appears that a mere diminution of mortality is not necessarily a mark of improvement in the public health, and that many corrections may have to be made before we are in a position to estimate justly the state of the public health, as shown in the mortality returns of the Registrar-General or in those of local medical officers of health.

But food and exercises exert great influence on public health as well as air.

But of important agents through which health is greatly affected, there are, besides air, at least two others, and these are Food (I do not discuss the effects of alcohol) and Movements or Exercises. What have we as a people been doing in these particulars? Our sanitarians and medical officers of health have preached sanitation, and they have denounced overcrowding, and they have done both to some purpose; but where are the instructions regarding food, and where are the recommendations as to methodised exercise or movements, whose object is to keep the body supple and lissome? As to the latter, it must be admitted that something has been done. Gymnastics have been introduced into the schools to a much larger extent than was the case thirty or forty years ago. And perhaps adults do pay a little more attention to keeping the muscles in exercise than used to be the case. Possibly the need for doing so is better understood. In the case of children and young persons of school age I think this is so. In the case of adults we hear too little about the necessity of exercises. At any rate, whatever be the causes, and notwithstanding the great advances which have been made in reducing the death rate from fevers and consumption, with the consequent improvement in the death rate of the earlier ages of life, there is still very much that is unsatisfactory in the Registrar-General's returns. For instance, in 1893 there occurred in England and Wales 569,958 deaths, and of these 216,833, or say two-fifths, occurred among children under 5 years of age. At the other extreme of life we find that 125,795 persons attained the age of 65 years or over. Over 85 years of age 11,570 persons died; from 75—85, 47,170 persons died; from 65—75, 67,055 persons died. In other words, adding all these three last numbers together, only 22 per cent. of the people, or very little more than one in five, attained the age, not of 70 years, which we look upon as the natural term of humanity, but an age short of that by 5 years. In 1892 the results were practically the same: out of 559,684 deaths occurring in that year, 205,864, or about the same proportion of two-fifths, occurred among children under 5 years of age; and only 134,097, or about 24 per cent. of the whole, were registered as occurring above 65 years of age. As an actual fact, then, it may be

Too little attended to.

Two-fifths of the total mortality in England and Wales takes place under 5 years of age.

said that to-day in England, in spite of all our progress in medicine and surgery, only one out of four or one out of five persons born into the world attains the age, not of 70, but even of 65 years; while about two-fifths of all the deaths that happen occur among children under 5 years of age. These results do not appear to be satisfactory. In our towns it is the same. In 1892 there were registered in Bradford 3927 deaths, and of these only 926, or 23 per cent., were of persons over 65 years of age. I may perhaps have to refer to the rate of mortality among children under 5 years in Bradford, and to show that if it has fallen (as it has) it is because a smaller number of children are born than there used to be.

Only about one-fourth of the population reach even 65 years of age, not 70.

But to pursue the inquiry into the general state of the public health. The result of the improvement effected in the last thirty or forty years, looked at as a whole, has been to diminish mortality at the early ages. More children reach maturity now than was the case formerly; but above the ages of 35 for men and of 45 for women the mortality has increased on the whole rather than diminished.

Thus, comparing the rates of mortality among males at various ages in the three years 1844-5-6, with that of the mortality of males at the same ages in 1891-2-3, the following results appear:—

Comparison of present rate of mortality with that of 50 years ago at different age periods. Males.

From 5—10 years of age, in the former period the mortality averaged 8·4 per 1000 living. In the latter period it was 4·8. From 10—15, in the former period it was 4·8 per 1000 against 2·7 in the latter. From 15—20, 6·8 per 1000 in the former period against 4·2 in the latter. From 20—25, the mortality averaged 9·3 per 1000 in the former period against only 5·5 in the latter. From 25—35 it was 9·6 in the former period and 7·5 in the latter. But from the ages of 35—45 the mortality was 12·4 per 1000 in the former period and 12·8, or ·4 per 1000 more, in the latter. From ages 45—55 years, the mortality was 17·3 per 1000 in the former period and 20·8 in the latter, a very considerably higher mortality in the later years. And the same obtains between the ages of 55 and 65 years, for in the former period the mortality was at the rate only of 30·3 per 1000 while in the latter it was no less than 38. Going still higher in life (although I have hitherto spoken only of the mortality of persons up to 65 years of age), it appears that in 1844-5-6 the mortality of persons between 65 and 75 years of age was at the rate of 66·3 per 1000, while in 1891-2-3 it was 75·8. And from 75—85 years of age it was 146·6 in the former period against 152 in the latter. Above 85 years the ratio was rather in favour of the latter period, being at the rate of 301·5 per 1000 against 319·1 in 1844-5-6.

The same for females.

In the case of females the following are the figures:—From 5—10 years of age, in 1844-5-6 the mortality was at the rate of 8·2 per 1000. In 1891-2-3 it was 4·7. From 10—15 it was 5·2 per 1000 in the former period against 2·8 in the latter.

From 15—20 it was 7·7 in the former period against 4·2 in the latter. From 20—25 it was 8·8 in the former and 5 in the latter. From 25—35 the mortality was 10·1 in 1844-5-6, against 7 in 1891-2-3. From 35—45 the rate was 12·2 in the earlier period and 10·8 in the latter. From 45—55 the rate in the earlier period was 15·2 per 1000 and 16 in the latter; while from 55—65 it was 27·3 in the earlier period and 31·2 in the latter. Up to 45 years of age the mortality among females was considerably lower in the earlier period than in the latter. From 45—55 the rates were about the same, with fractional worsening in the latter period. From 55—65 the rate of mortality was considerably worse in the latter period than in the earlier. At the higher ages we find the mortality from 65—75 years of age to have been 60 per 1000 in 1844-5-6, against 66·2 in 1891-2-3. From 75—85 it was 134·1 per 1000 in the earlier period and 140·2 in the latter; and above 85 it was at the rate of 296·3 in the earlier period and only 274·8 in the latter. Apparently when women survive to extreme old age now, they have a better chance of continuing to survive than they had fifty years ago; but with this exception the mortality is now greater than it used to be at all ages above 45. And, as has been seen, the same thing holds for men, except that their increased mortality begins at 35 in place of 45, as is the case with women.

Expectation of life now better at the extremes: scarcely any better at the middle periods.

In 1892 there died in England and Wales 170,104 persons between the ages of 25 and 65 years. In

About one-third of total mortality still occurs between 25 and 65 years of age; that is, in the prime of life.

1893 173,125 persons died at those ages. These deaths constituted nearly one-third of the whole mortality. Surely this cannot be considered satisfactory. That nearly one-third of all the deaths that happen should take place between the ages of 25 and 65 years, in early adult life, in middle age, and in early old age, that so large a proportion of these deaths should happen in the very prime of life seems to me the opposite of satisfactory; and considerations of this sort keep arising in my mind when I am told, as I so often am, of the enormous advances which have been made in medicine and surgery. A more suitable attitude of mind, it seems to me, instead of boasting of our advance, is to reflect that in a properly constituted society hardly any of those deaths ought to have happened. And what was medicine doing that she did not prevent them? A few fatal accidents must no doubt have happened (6614 deaths occurred in England and Wales in 1893 from accident, between the ages of 25 and 65), and perhaps some few deaths must have occurred from unavoidable causes among such large numbers of people, but if 20 per cent. were set aside for such contingencies (and surely that is a large proportion), the fact remains—the appalling fact, it seems to me—that something like 136,000 people lost their lives in England and Wales in the year 1892 who ought not to have died. And they fell, with all the obligations of life on them still unfulfilled, leaving children fatherless and motherless, and in most cases unprovided for, the while that we

136,000 persons died in England in 1892 between ages of 25 and 65 years; and this after *deducting one-fifth for possibly unavoidable causes.*

are looking on, and continually singing triumphant songs about the great progress of medicine and surgery. They have advanced no doubt. Bacon's aphorism regarding medicine, that it has been *magis elaborata quam amplificata*, rather laboured than advanced, is, I was going to say, true no longer; but really, in view of the facts just quoted regarding the mortality at the middle periods of life, I do not know if I am justified in saying so. But I certainly am justified in saying that, whatever advances have been made, there is still much, very much room for improvement.

Let us try to see further into the facts. Of the 569,958 deaths occurring in England and Wales in 1893, 216,833 were deaths of children under 5 years of age, almost exactly two out of five. Of what did the other three die? There were 353,125 deaths remaining to be accounted for, after deducting the deaths of children under five years of age, and of these 173,125 persons died between the ages of 25 and 65. Of what did they die? But, first of all, why did they die at all; or if 20 per cent. of the number must have succumbed to the unavoidable risks of life, what about the 138,500 or so remaining? And, as I asked before, what was medicine doing that she did not prevent them? If human beings have vitality enough to reach the age of 25 or 30 or 35 years, why should they not live to the ordinary term of humanity? Why not, at any rate, to 65, if not 70? It is for medicine to say why. I think it must be taken as a principle that if human beings have energy enough to live to adult age, they ought to live to old age, or at least to the three score years and ten which have for so long been considered the term of human life. In other words, death before 70, or at any rate before 65 (which is giving a full margin of five years, and making by so much less the task of medicine), death before 65 years of age is preventible, and ought to be prevented. With this principle in our minds, let us proceed in our inquiry. The commonest cause of death in England is bronchitis. It is also an increasing cause of death, as we shall see. It is supposed to be due to cold, but the climate is no colder than it was a generation ago. I am going to call in question the belief that bronchitis is due to cold. I am sure that bronchitis is far more the effect of improper feeding than of cold. I am certain, in other words, that bronchitis is far more a matter of food than a matter of climate. I believe that cold is often the exciting cause of bronchitis, but I think heat is as often the exciting cause. The true statement, I suppose, is that in those predisposed to it cold is often the exciting cause, and so is heat, but that without the predisposition neither cold nor heat would induce bronchitis, for I believe that humanity is intended and fitted to endure without damage both cold and heat. And predisposition—what is that? I believe that predisposition can, theoretically, in most cases of disease, and as a matter of fact, and practically

Bronchitis the commonest cause of death in England, accounts for about one-tenth of mortality.

Is Bronchitis due to Cold?

in nearly all cases of bronchitis, be defined in terms of the influence on the economy of air, food, and work. As I must return to this question later, I will here go on to say that in 1893, among the persons who passed the deadly age of nothing to 5 years, there occurred 34,114 deaths from bronchitis, or 9·6 per cent. of the 353,125 deaths which, as we have seen, occurred in England in 1893 among persons over 5 years of age. Pneumonia (also an increasing cause of mortality) accounted for 22,464 deaths over 5 years of age, or 6·3 per cent. of the 353,125 to be accounted for. From asthma there occurred 2282 deaths, or ·6 per cent. I add asthma to bronchitis, because I believe it to be nearly always catarrhal, as bronchitis is, and as pneumonia often is; for "pure spasmodic asthma" is so rare that I at least do not remember one case of it in the last ten years; and the cases I saw before that time only seemed so through my ignorance, and because of the tyranny of the preconceptions handed down to me from a bygone generation. These three diseases then—bronchitis, pneumonia, and asthma—accounted for 16·3 per cent., or about one-sixth of the 353,125 deaths in England over 5 years of age. From diseases of the circulation (heart and vessels) there occurred 47,678 deaths out of the 353,125 to be accounted for, or 13·5 per cent. (only 780 deaths occurred from this cause under 5 years of age, so that in infancy it is practically of no moment as a cause of mortality). But it seems to me that apoplexy, although classified

Pneumonia also an increasing cause of death.

Further analysis of mortality. Diseases of circulation.

among diseases of the nervous system, is really a disease of the arteries, as, indeed, so is hemiplegia for the most part, so I think we ought to add the 24,291 deaths from these causes (nearly 7 per cent. of the 353,125) to the 13·5 per cent. caused by diseases of the circulation, which would then stand at 20·5 per cent. of the whole mortality above 5 years of age. *Consumption.* From phthisis and scrofula there took place 44,579 deaths, or 12·6 per cent. of those to be accounted for. *Cancer.* Cancer (from which hardly any deaths occur under 5 years of age, only 94 deaths being due to it in 1893) accounted for 21,041 deaths, or nearly 6 per cent.; and from diseases of the digestive system 19,997 deaths occurred, or 5·6 per cent. By these causes we have accounted for 68 per cent. of the total mortality above 5 years of age, leaving to be accounted for 32 per cent., as the effect of the continued fevers, the parasitic diseases, dietetic diseases, accidental causes, violence, old age, and ill-defined causes of death.

Diseases of a people are an index of the habits of that people.

I suppose it will be admitted that the diseases from which a people are suffering are an index of the habits of that people. If certain diseases are increasing as causes of mortality, I take it that there must be reasons for that in the habits of the people. Now habits appear to resolve themselves, not wholly perhaps but mainly, into the continuous effects on the economy of air, food, and work, or exercises or methodised movements.

Of course accident and violence are causes of death, but in comparing past periods with the present in the history of this people, is there any reason to think that accident and violence are commoner as causes of death than they were? I think not. Legislation has been active in this direction as well as in others; and in compulsory fencing of machinery, defence from dangerous places, compensation for injuries sustained in the prosecution of daily occupation (which, if not compulsory, is at least much more common than it used to be), and in other ways, has taken what steps it could in the way of preventing death from accident and violence. I do not know that much importance can be attached to the figures, and I do not lay much stress on them, but so far as can be made out there is no increase of mortality under this heading among the people of England, but if anything there is a diminution. Thus the deaths returned as from accident in 1868 were in the proportion of 30,867 to 1,000,000 deaths from all causes, while in 1893, a quarter of a century afterwards, they were at the rate of 29,615 to 1,000,000 deaths from all causes. There is at least no increase of mortality from this cause. In 1868 there were 681 deaths returned as due to accident and negligence per million persons living; in 1880 there were 589 per million living; and in 1892 there were 553. But if death from accident and violence is not increasing, but, if anything, diminishing in the country (and after all accident is a comparatively small cause of mortality), it will be interesting to inquire what

Accident not so important a cause of mortality as before.

diseases *are* increasing in fatality. It is evident that some must be increasing, since we have seen that a great diminution of death from fever and from consumption has occurred, and yet that the mortality of men from 35 to 65 years of age is rather greater, or at least no less than it was forty years ago. Here are some figures which seem rather striking. Bronchitis is the commonest cause of death in England. It accounts for something like one-tenth of the total mortality, or in other words something like 100,000 deaths out of every million deaths that occur take place from bronchitis. This is sometimes called the proportional number, and I propose to make use of this expression. Comparing then the mortality from bronchitis in various years, we find that the proportional number to a million deaths from all causes was 67,765 in 1868; 89,346 in 1869; 109,881 in 1880; 119,455 in 1892; and 99,456 in 1893. With the usual ups and downs that characterise statistical figures, like the rising tide which overtops a rock and then falls back for some time, rising again till not only that but other and higher points are submerged in turn, it is plain that bronchitis is now a rising or increasing cause of death, and that it accounts for a larger proportion of the total mortality than it used to do. In other words, its proportional number is greater. From consumption on the other hand the proportional number is smaller. Thus in 1868 its proportional number was 107,869; in 1869, 106,422; in 1880, 91,414; and

Proportional number of Bronchitis increasing.

Proportional number of Consumption diminishing. Heredity not the cause of this.

in 1893, only 76,553. We know the causes of this fall as has been already said; and they are, in one word, sanitation leading to the purification of air. Heredity is not the cause. We have not treated the ancestors of persons suffering from phthisis; we have treated their children, the persons themselves, not indeed altogether those whom we found suffering from the disease, but those who might suffer. And we have treated these potentially phthisical people by supplying them with a larger amount of air and of cubic space per head. This is particularly noticeable in the case of the army and other large assemblages of men, such as inhabit prisons and penitentiaries. The commission which sat in 1858 to investigate the causes of consumption in the army after the Crimean war did not, in making their recommendations to Parliament, say one word as to the family history of our soldiers. They did not, so far as I know, throw out a single hint that it was desirable to recruit the army from men in whose families consumption was not prevalent. It did not seem to have occurred to them to inquire whether the parents or brothers or sisters, not to mention grandparents, uncles, aunts, or cousins, of the recruits had suffered from consumption, or whether, as the phrase is, consumption was prevalent in their families. The men themselves were to be accepted or rejected on the merits of their personal state or personal history, just as was the case before the inquiry, and as has been the case since. What the commission recommended was that after the men were enlisted, the cubic space allotted to them in barracks should be very considerably increased; and when the recommendation was carried out, the mortality from consumption fell, as is well known, from 12 per 1000 per annum, at which point it stood about the time of the Crimean war, to 1·2 per 1000, or exactly one-tenth of its former rate. Similar results have followed the provision of a larger air-space to residents of prisons and penitentiaries, not to speak of hospitals and infirmaries. And similar results, though not quite so satisfactory, because governmental or municipal control of the civil population is not so complete as it is in the case of soldiers and prisoners, have followed better sanitary conditions among the people at large. Place the soldiers back again, place the prisoners back again, place the community back again in the old conditions as to cubic space or as to cellar dwellings, over-crowding, narrow streets and absence of public parks, and the former rate of mortality from phthisis will recur, whatever care we exercise in choosing our population from families free from the taint of consumption.

Proportional number of Pneumonia increasing.

Then as to pneumonia, the proportional number of deaths from this disease in 1868 was 41,761; in 1880 it was 47,728; in 1892 it had risen to 65,914; and in 1893 it was 67,104. It is clear that this also is an increasing cause of mortality.

Other increasing causes of mortality are apoplexy, diabetes, and cancer.

From apoplexy in 1868 the proportional number of deaths was 22,258 to a million deaths from all causes; in 1869 it was 22,506; in 1880 it was 27,095; in 1892 it was 30,603; and in 1893, 29,737. As to cancer, as is well known, the facts are very striking. Thus in 1868 the proportional number of this disease was 18,627; in 1869 it was 18,964; in 1880 it was 25,189; in 1892 it was 36,365; and in 1893, 37,082. The proportional number of this terrible disease has all but doubled in twenty-five years. It is, however, somewhat reassuring to notice, and the fact should not be forgotten, that the increase in the proportional number of cancer is by no means equal to the diminution in that of phthisis; or in other words we have as a people gained very much more by the saving effected by the decrease of consumption than we have lost by the increase of cancer. Cancer, on the worst view that can be taken of it, is not among the commonest causes of mortality; it is, for instance, not to be compared with bronchitis, or pneumonia, or consumption; while, as compared with the aggregate of these three causes, it may almost be considered a bagatelle. Diabetes is a very small cause of mortality; but, as in the case of cancer, the increase is very marked. Thus in 1868 the proportional number was 1408; in 1869, 1496; in 1880 it was 2008; in 1892 it was 3593; and in 1893, 3653. It has more than doubled in a quarter of a century. Something may perhaps be due in respect of diabetes to better

Also of Apoplexy.

Cancer.

Much more, however, gained by diminution of Consumption than lost by increase of Cancer.

Diabetes.

Better diagnosis not the main cause of these changes.

diagnosis, and to more accurate naming. Less attention was paid to diabetes twenty-five years ago than is paid now, and I think probably the diagnosis was less exact. But I do not think that this holds good of any of the other diseases I have referred to. My recollection goes easily back to 1868. I think that medical men could and did as easily differentiate bronchitis from pneumonia, and both from phthisis, as they do now. If some cases of bronchitis were returned under the heading of phthisis, I think a similar proportion of cases of phthisis were included under that of bronchitis, and the same I believe to be the case as to pneumonia. And I think the diagnosis of cancer and even diabetes was correct enough twenty-five years ago to ensure practical accuracy and to eliminate substantial error, so that I do not think that mere change of naming accounts for much of the change under these headings, though it may account for some. As to apoplexy, its diagnosis was, I think, as substantially accurate in 1868 as it is now. It seems, therefore, that we must admit a considerable real increase, as well as an apparent one, in the incidence of these diseases. As to cancer, some have said that as it is an affection of advancing life, and as there are more persons living now at advanced ages than there used to be, we must expect a larger proportion of cases of cancer, the inference being that we should even welcome their occurrence as a proof that we are living longer than we used to. But surely this fact (if it is one) could not account for a doubling in the proportional number of cases of cancer. Granting, for the sake of argument, that it justifies the expectation of an increase, I do not think it can possibly account for *such* an increase. This consideration dissatisfies me with the view just referred to.

Is Cancer appearing at earlier ages now than formerly? No.

I have seen so large a number of young women, say from 20—30 years of age, suffering from cancer, that it has sometimes seemed to me as if cancer was attacking the population at the present time at earlier ages than it used to do. This impression was so strong on my mind that I thought it well to inquire further into it. On further examination, however, it does not seem as if the impression is a sound one. A fair method of making the inquiry appeared to be to find what proportion the cases of cancer appearing at ages, say 25—35, 35—45, and 45—55, bore to the total mortality from cancer at different periods of time, say twenty-five years apart from one another. When this is done for 1868 and for 1893, the following facts appear:—In 1868, out of a total mortality from cancer of 8880 cases, 366, or 4 per cent., occurred among persons from 25—35 years of age. In 1893, 638, or 3 per cent. out of 21,135 cases occurred. At ages 35—45, 1151 cases, or 12 per cent. of the total, occurred in 1868: in 1893, 2225 deaths occurred, or 10·5 per cent. Between the ages of 45 and 55 years, 2086 cases occurred in 1868, or 24 per cent. of the whole; at the same ages in 1893, 4648 cases occurred, or 22 per cent. The figures do not come out as I expected. In fact, so far as they go, they appear to show that cancer is appearing rather later in life than it used to do, not earlier as I feared; and it must be said of an inquiry of this sort that it only shows how much mistaken one may be, and how unwise it is to trust to impressions if facts can by any means be obtained instead. I can only suppose that seeing a considerable number of cases occurring in somewhat early life so impressed and depressed one by the experience as to lead one to attribute an exaggerated importance to them, and to make unwarranted inferences from them.

Propositions regarding Cancer. It is the culmination of mal-nutrition in tissue.

Before going further I think I ought to set down one or two considerations regarding cancer and conclusions I have arrived at, because they form part of the argument to be advanced later. First of all, cancer appears to me to be a dyscrasia or culmination of mal-nutrition in tissue. When any part of the body gets into this dyscrasic ill-nourished state, it breaks down into a softish invasive or aggressive tissue, which involves neighbouring parts in similar action, spreading along the lymphatics and involving the glands, and destroying the patient by exhaustion. It is very often accompanied by passive effusion of large quantities, even pints of fluid into the serous cavity nearest to the site of the disease. Thus pints of fluid may be found in the pleural cavity after death from mammary cancer, or in the peritoneum from uterine cancer. (The first stage of cancerous growth often takes the form of stony hardness, but this gives way to softening, and sooner or later, to ulceration in every case.) This cancerous dyscrasia is, however, as I have said, only the culmination, or the final stage in a long series of processes, each of which is a mark of ill-health, such as tonsillitis, pharyngitis, dyspepsia, anæmia, bronchitis, pneumonia, asthma, rheumatism, or rheumatoid arthritis, leucorrhœa with dysuria, which affections have preceded the onset of the malignant or cancerous disease. These affections, or some of them, have generally been present for years before the cancerous changes appeared. I do not of course say that the person suffering from cancer will be found to have suffered from all of these affections, though some will, but almost all will be found to have suffered from some one or other of them; and in some cases malignant disease is present, *along with* the milder disorders mentioned. Thus, one of my colleagues at the Bradford Infirmary asked me to see a woman, aged about 50, in whom he had accidently discovered cancer in the cervix uteri. She had no symptoms of any moment; and I corroborated his diagnosis. The woman was being treated for rheumatoid arthritis, having the finger-joints enlarged, thickened, stiff, and more or less painful, when her fatal but previously-unsuspected cancer was discovered.

Always preceded by one or more of a succession of minor ailments, commencing generally with indigestion.

Miss H., æt. 45, had her left breast removed for carcinoma in Bradford in 1895. At that time she was suffering so severely from lumbago that she would have had to be in bed on that account alone, even if no question as to the state of the breast had arisen at all.

Mrs. M. came to me in 1895 with a recurrence of scirrhous cancer of the mamma, which I had removed eighteen months before. She was 66 years of age and was then suffering besides from bronchitis with over-distension of the air-cells, and had a weak, flabby, dilated heart. The cancer was in her case only the culmination of a long series of steps in mal-nutrition which, even if they had occurred without the onset of cancer, would have been of themselves sufficient to destroy life. I dare say it will be said that cases like these prove nothing, since any one may have lumbago, or rheumatoid arthritis, or bronchitis, or emphysema, or a weak, flabby, dilated heart, while comparatively few suffer from cancer. But I think, on the other hand, that if in person after person who presents herself to us suffering from cancer we find (as we generally do) on inquiry a history of long-continued suffering from dyspepsia, or rheumatism, or gout, or bronchitis, we cannot put the previous or concomitant affections down as accidental, or think that no importance should be attached to them. It seems to me that the proper view to take is to consider these ailments as steps in the general process of continuous ill-health and to view the cancer as the culmination of that process. Apoplexy and Bright's disease are other terminations of this long-continued process of mal-nutrition; and these affections often terminate life in persons who, had they lived, would or might have suffered from cancer. And at any time of course such persons are liable to be carried off by an intercurrent attack of broncho-pneumonia or of influenza, &c. There seems, however, to be in operation, generally, or as a rule, what we may view as a particular case of the general law of parcimony in respect of the occurrence of fatal disease in the body. When one fatal disease is in operation it is not usual to find also another present in the same person at the same time. There are exceptions to this rule, no doubt, as when what is popularly termed "a complication of diseases" is present. And, no doubt, degeneration, when it takes place, is apt to be general, a weak, dilated, and flabby heart being present, as well as bronchitis and emphysema, along with the concurrence of albuminuria, and so on. But generally speaking the weakness manifested by patients is apt to take a particular form, and we see them suffering from pneumonia alone, or bronchitis alone, or rheumatism alone (and yet how many rheumatic persons are continually "taking cold" as it is called), or cancer alone, or apoplexy alone. It would probably be more correct to say that these affections rise into such prominence as to overshadow the others, since when a patient is about to succumb to a fatal disease it is often a matter of accident whether he falls before this, that, or the other.

Law of parcimony in disease.

How various diseases arise.

How do these various diseases arise? They for the most part begin with dyspepsia or indigestion, very often of the fermentative sort, the patient complaining of being blown up with wind after eating, or of having pain or heartburn. This leads to imperfect formation of chyme and chyle, which in turn leads to imperfect formation of blood. Very often such persons have lost their teeth, which decay and break away owing to continued exposure to a too acid state of the secretions. The imperfectly-made blood is loaded with undigested particles which it carries to the tissues. These in turn are not properly nourished, and various consequences ensue, the chief of which may be summed up in one word: that the tissues which ought to have been firm, elastic, and resilient, become soft, swollen, and flabby, and prone to various inflammatory disorders. Thus the muscles ache when used, and weariness sets in after very slight exertion; mucous membranes become soft and swollen, and various catarrhal conditions ensue, as tracheitis, bronchitis, diarrhœa, leucorrhœa, sore throats, headaches, or herpetic eruptions on the lips; and "colds" occur too easily and seemingly without cause, or from insufficient cause; or rheumatism may occur, or an attack of rheumatic fever; while later in life some of the graver or more chronic forms of disease may appear, as diabetes, Bright's disease, or heart disease. If things go on, still more grave conditions may arise; an intercurrent attack of severe broncho-pneumonia or of influenza, followed or accompanied by pneumonia, may make its appearance and perhaps even carry off the patient.

Occurrence of passive congestion of muscle-sheaths. Perimysitis.

Before, however, these, or the gravest of these affections have shown themselves, a condition has arisen, I think in all cases, but certainly in almost all, to which comparatively little importance has been attached, and which, indeed, to a large extent, appears to have escaped notice. I have just referred to the state that the blood gets into as a consequence of indigestion, and as the effect of the mal-assimilation of food, and of the imperfect elaboration of the digestive juices, whose function it is to refresh and enrich the blood. The blood in that case becomes loaded with waste matters which ought to have been oxidised off; and the corpuscles themselves, instead of being round and smooth, and sliding or gliding along one another as a rouleau of coins does, become serrated at the edges and sticky and adherent to one another, and to the interior of the blood-vessels in which they flow. One inevitable result of this, as all know, is that passive congestion of the tissues takes place, that the interiors of the vessels become blocked by the opposition offered to the flow of the blood along their course, and especially along the finest capillaries, and that in short the inflammatory process has begun. Of this, as it has been so long and thoroughly studied, I do not propose to say anything. Every one knows how exudation occurs and how effusion and fibrinous deposition takes place in the cellular tissue, or in the heart valves or other places, and the dire consequences of this are well known. But it is to a condition anterior to this that I wish to draw attention. Before these gross damages have taken place in the body, slighter changes have occurred which can always be detected by examination, but which nevertheless seem to me to have attracted far too little notice. I do not know that I can better draw attention to this than by means of an illustration. If a stockbroker or private individual has taken up more stock than he can carry, he is obliged to unload, and this he does on to the public, or on to his friends as he can, by disposing of his stock by sale or otherwise. The blood loaded with waste unoxidised particles, as I have described, from the digestive system, finds itself compelled, so to say, to unload. The combustion taking place in the bronchial mucous membrane does not go on quickly enough to rid the blood of the waste unoxidised material. The blood then quietly deposits its extra load in the least hurtful places, and as the blood courses along the vessels lying in the muscle sheaths, and in the muscle-septa (where every surgeon knows he must pick up the vessels which he wishes to tie during his operations, and where every anatomist knows he must trace them out during his dissection), it drops there as much of the waste material as it can get rid of. The consequence of this process is that these muscle-sheaths become passively congested and loaded with waste matter. I have no doubt at all that this passive congestion, and the presence of this waste matter in the muscle-sheaths, is the main cause of the weariness and facility of fatigue from which so many people suffer, as well as of the nameless pain and spreading aching which passes along their limbs after even slight exertion. Some hours, say three or four, after a meal it has happened to many persons that they feel a sudden weariness for which they cannot account, and for which the little exertion they have undergone is no sufficient reason. What is the cause of this? They are often puzzled by it, and inquire of the doctor as to the cause. The cause is that the time has come in the digestive process when the food, or some of it, has found its way, in the form of chyle, into the general circulation; that, the food being imperfectly assimilated, the chyle has been imperfectly made or formed; that unelaborated material has therefore been poured into the blood current; that the blood has therefore been loaded with waste and unassimilated materials which it at once begins to relieve itself of, and by preference it relieves itself by depositing these on the muscle-sheaths, which, therefore, do not work smoothly and easily. They appear to cry out for fatigue, whereas in fact they cry out because they are more or less poisoned by bad blood containing ptomaines and other unassimilated materials. The blood is said to contain uric acid. No doubt it often does; but it is very unlikely that uric acid is the only poison carried by the blood to the tissues. No doubt other materials mentioned in

Weariness after a meal: how caused. Is it related to Rheumatism?

other parts of these observations are carried to the muscles (and other tissues) as well as uric acid; and very likely some materials not yet known to the physiologist or therapeutist accompany them. They may, however, all be conveniently classed together under the general name of waste-products from the digestion, or unassimilated digestive materials. One can even see how a meal too large, even if it is properly digested (which, however, it is not likely to be), may cause the feeling of fatigue in this way, since more chyle may find its way into the blood than can be conveniently assimilated in a given time, and so, by over-loading the muscles, may cause the puzzling feeling of fatigue without exertion, or perhaps what is as puzzling till we think about it, the feeling of being very tired when we wake in the morning at a time when the rest of sleep ought to have refreshed and invigorated us. During sleep the laying down of digested (and undigested) stuff has had plenty of opportunity to quietly take place. It does take place accordingly; and if we have taken too much food the day before, much more if our food has been unsuitable and imperfectly digested, the organism cries out, we wake stiff and partially poisoned, and think we are too tired, and may even think we are under-fed, and by taking more food do ourselves still more damage. Similar phenomena occur during waking hours and times of work; and when this overloading of the blood with undigested material

Why we sometimes awake tired in the morning.

has occurred to a considerable extent, and has been deposited along the muscles, other facts may be noticed. Thus, as the slight contraction caused in the muscles by the presence of the waste material passes from point to point along the course of the long muscles of the limbs, so does the aching spread, and one can read in the faces of patients during exertion (or even feel in one's own body) the peculiar slow gliding effects of it. I suppose I must not call this rheumatic pain? Not wholly to my surprise, I found on a recent occasion that the medical profession has not made up its mind what is rheumatism and what is not. I have no doubt on the matter myself. I am certain that the condition is best named *perimysitis rheumatica.* I imagine that if Dr. Haig were asked about it, and supposing he admitted the existence of the condition (which, strange to say, not all medical men do), he would say it was due to the presence of uric acid in the blood in the first instance, which is deposited in the muscle-sheaths in the second. Is it due to the presence of lactic acid in the blood? Is it due to the presence of other products of imperfect indigestion? What about butyric acid? Or others? As a rule, in the condition leading to this state of things the urine is very acid, far more so than it ought to be. I believe that this very acid condition of urine often leads on to nephritis and ureteritis, cystitis, urethral caruncle, and other troubles; but I do not wish to deal with

Is Perimysitis rheumatica a good and proper name for it?

this now. But some acid seems to be at the bottom of it. However this may be, as I do not wish to stir up controversy, I will speak of the condition not as perimysitis rheumatica (though I do not doubt it is so), but simply as perimysitis, or perhaps better still as myalgia. Myalgia then is present in a vast number of persons in whom its existence does not seem to be suspected. It is I believe the foundation in altered structure of much organic disease, just as the foundation in altered function is the dyspepsia or indigestion on which in turn it depends. It is found in childhood, it is found in youth, it is found in middle life, and it is found in old age. Grasping the muscles with a broad gentle firm grip will demonstrate its existence in all these classes of people. Nine out of ten of the young women who find their way to our consulting rooms are suffering from it; and it is very common indeed among men also, though not so common, owing mainly I have no doubt to the different way in which men still live as compared with women. When the myalgia affects the abdominal muscles, it is often called ovarian neuralgia, but in the great majority of cases the affection is neither ovarian nor neuralgic, it is myalgic. Not that there is no such disease as ovarian neuralgia—I am far from saying that—but I am sure ovarian neuralgia is often a diagnosis when the proper diagnosis ought to be abdominal myalgia, or spinal myalgia, myalgia of the muscles of the abdomen or of the spine. These affections

Affections not necessarily "nervous" because they come and go suddenly.

are often called nervous, mainly because they go and come rapidly and because women (and men) suffering from them say to-day that they are very ill and to-morrow that they are quite well, while the next day they are as ill as ever—and all this though no organic lesion can be discovered to account for their complaints. Dr. Haig has luminously told us how to account for these sudden changes—at least I have got from him a satisfactory explanation of these erratic and otherwise inexplicable changes, although he has not, so far as I am aware, had these precise facts in his mind or under his observation. But the explanation of them no doubt is that at one time when the women complain so bitterly, uric acid (is no other acid competent to account for the condition? *Must* it always be uric acid?) is floating in the blood and clouding all the powers of perception, and of enjoyment, and of motion. At another, when they feel much better, the uric acid (the same parenthetical question recurs) has been deposited from the blood into the tissues (the muscle-sheaths, *e.g.*), and the blood being cleared, the person feels very much better. But the evil has of course not been cured, and the same conditions which induced it before may easily bring it on again; and so the patient who yesterday felt so well because the uric acid was out of the blood, feels to-day as ill again as ever because the uric acid is again floating in the blood and reinducing all its former ills. This explanation also incidentally shows how a succession of these alternations leads to chronic and organic disease, inasmuch as the tissues are being more and more loaded with uric (and other ?) acid and are undergoing structural damage which may soon become irreparable.

But the muscle-sheaths are not the only places in which these changes occur. The nerve-sheaths suffer in the same way. They also offer at first places in which the blood may easily unload itself of its waste-matters. Hence we have various neuralgias, as *e.g.* of the supra and infra-orbital nerves, of the great or suboccipital, and by and bye of the great sciatic or anterior crural, or of the intercosto-humeral, or, in fact, almost any and every other nerve. These affections are known in practice under the names (to take only a few instances) of *megrim*, *suboccipital neuralgia*, *sciatica*, *pectoral angina* (though this last is often an affection of the heart-muscle—cardiac *mysitis* ?—itself), and so on. My own conviction is that these also are rheumatic affections, and are really most of them cases of *perineuritis rheumatica*; but, of course, I do not press this view, being compelled for the present to accept the neutral name neuralgia, so as to avoid controversy. It may, however, be observed, in passing, that names like neuralgia and myalgia (and ostealgia and periostealgia might be added to them) are not good names for diseases at all; they are not pathological names; they are what I have elsewhere called functional names, indicating, that is, changes of function in

Neuralgia. Perineuritis rheumatica.

Names of diseases ought to be founded on anatomy.

the parts referred to in the roots of the words. Their very existence is itself a proof, or at least their existence raises a suspicion, that the diseases pointed to by them have not been clearly or definitely diagnosed. To say that a woman has neuralgia is, after all, only to tell her in Greek terminology what she told us in English, when she came complaining that she had pain. By calling her ailment neuralgia we imply that the pain is associated with some kind of change in some nerve. We also (I suppose) imply that the nerve-change is functional and not organic. When this last implication or suggestion is analysed, however, I have a strong suspicion that very little is meant—except, perhaps, that we do not know very precisely much as to the nature of the nerve-change. It would probably be much better in most cases to say this plainly, if it is so. I think, however, that often we could go a good deal further than this, and that we could often (if we tried) tell her not only what nerve or nerves are affected, but also how they are affected. In this case we could give to her disease a pathological as distinguished from a physiological or functional name. In fact, our name would (or might) be scientific. Neuralgia of the face, or *megrim*, is a diagnosis sometimes made by doctors. But *perineuritis supra-orbitalis dextra (vel sinistra)* is a scientific name so far as it goes, and any instructed person can at once see the difference between the former functional or physiological names, and the latter pathological, anatomical, and scientific name. If we could go further and call the affection *perineuritis supra-orbitalis rheumatica* (or *simplex*, supposing we thought it so), it is evident that we should have advanced still further towards the giving of a scientific name to the complaint. I think we often could go this length, but, of course, I do not wish to press my own opinions. It will be sufficient if the attention of competent persons is drawn to the subject. But I think that any one who really turns the question over in his mind will find himself very much dissatisfied with such names as megrim, sciatica, lumbago, neuralgia, and the like as names of diseases. All that we do by using such names is to translate into Greek or Latin terminology the complaints made to us by patients in the vernacular. Definiteness in ideas is one of the marks of progress in science; and definiteness in naming speedily follows in the train of definiteness in thinking. And the translation of this observation in respect of the names of diseases is that they should be founded on anatomy, rather than on physiology, that they should point to the structure affected and how it is affected, rather than to the changes in function consequent thereon. In short *perineuritis* is a real and good name, while *neuralgia* is not. *Neuritis* is of course also a good pathological name, but I have instanced perineuritis because perineuritis is so much commoner an affection than neuritis (and perimysitis, or perimyositis, than mysitis, or myositis).

They should not be functional names.

If, following out the principles pointed at in these intercurrent observations, we search for a name or term to denote the presence of waste materials in the blood, due to the imperfect assimilation of food, or other causes, we might choose, say, *Triphthaemia* (τρίβειν to rub), or *Xenaemia* (ξενὸς, strange or foreign). I prefer *triphthaemia*; and although unwilling to introduce a new name, am compelled to do so, in order to avoid the need of using the cumbrous paraphrase, "accumulation of waste materials in the blood, whether from imperfection of digestion, or from breaking down of the tissues of the body themselves from imperfect nutrition, over-fatigue, or other causes." The presence of uric acid in the blood might be called *oxy-urichæmia*, or *urichæmia*, or of lactic acid (if there *is* such a condition—the chemists must tell us) by *oxy-lactichæmia*, or *lactichæmia.*

Triphthaemia
Xenaemia.

But besides the muscle-sheaths and nerve-sheaths, the brain-membranes are apt to become passively congested by the tendency of the blood to unload upon them. This leads to two main sets of symptoms, either on the one hand to increase of irritability, nervousness, and too keen sense-perception, in which every faculty becomes preternaturally acute, sleeplessness being often concomitant; or, on the other hand, to dulness of intellect, thickness of perception (as if the faculties were wrapped in cotton wool, patients sometimes say), general hebetude, impairment of memory, with restless and perhaps dreamful sleep: sometimes too deep or heavy sleep. I scarcely like to call these conditions meningitic; nevertheless I believe they are so. The state is comparatively rarely serious, not often, happily, going on to the inflammation that leads to effusion and coma. Nevertheless it does so occasionally, and I have known one or two cases of death from it in young women, which at the time seemed inexplicable; and also cases where insanity has supervened, due, I suppose, to passive congestion of the meninges. In older women also it is the cause, I believe, of the delirium that not infrequently sets in after ovariotomy or other abdominal operations, which, as surgeons, we are sometimes so much puzzled to explain.

Passive meningeal congestion a cause of insanity after operations.

Lastly, besides the muscle-sheaths, the nerve-sheaths, and the brain-and-cord-membranes; the periosteum, the tendons and the arthritic ligaments offer sites on which the blood can and does unload itself, and we have various forms of periostitis and of arthritic tenonitis set up in these cases. How often in "hysterical" girls, so called, do we not find swellings of the metacarpal and carpal bones, and more or less stiffness of the joints? I have seen such affections called "nervous" even by experienced and distinguished practitioners. I take the liberty of christening them *periostitis*, *arthritis*, and *arthritic tenonitis*, and saying that they are not nervous at all. Perhaps I ought to call them *periostealgia* and *arthritic tenonalgia*, in order to avoid controversy,

Periostitis often confused with Neuralgia.

although I do not conceal my own view, that *periostitis rheumatica*, and *tenonitis rheumatica* would be truer and more instructive names, just as I think that *meningitis passiva rheumatica* would aptly name the affection of the brain-and-cord-membranes to which I have just referred.

Meningitis passiva rheumatica?

Such names as periostealgia and tenonalgia would, however, be bad or functional names, which I have no wish to introduce or be sponsor for; and if I allowed the diseases referred to, to be so called, it could only be so under protest and as a makeshift, until clearer ideas began to reign in this department of medicine.

If any one objects to *meningitis* as a name for the passive congestion underlying the attacks of delirium and even insanity, which so often follow great surgical operations in elderly men and women, let him recall to mind the congestion of tendons, and of the parts about joints (*e.g.* the elbow or knee), which is often present for years before an attack of acute inflammation and effusion occurs. A patient suffering from such an acute attack will have his tendons floating in a bath of serous effusion, which slowly absorbs and leaves the parts stiff for a long time afterwards. The passive and mild congestion may have been present for a long time, often for years, before the acute attack with serous effusion occurred, and could have easily been diagnosed by the tenderness present in the tendons and about the joints. Indeed, had proper treatment been adopted, the acute attack need not have occurred. So it is with the membranes of the brain and cord. They also are often passively congested for a long time before there sets in an acute attack, accompanied by delirium, effusion, and coma. Their condition could not indeed have been directly discovered in the same way that that of the tendons and joint-structures could ; but it could have been easily inferred from the tenderness detectable in the sheaths of such nerves as the supra- and infra-orbital and others, which sheaths are the direct anatomical continuation of the brain-and-cord-membranes. Or the congested state of these membranes could have been inferred from the great tenderness to pressure that can be made out in the parts about the occipital condyles ; and had proper treatment been early applied, the delirium or insanity could have been prevented, inasmuch as the acute congestion would not have occurred.

In any case, I think the parts named are the parts of the bodily structures on which the blood most readily unloads its undigested and unoxidised waste materials; and these parts are found to be tender, yes, and very tender in the large majority of persons of both sexes over 30 years of age who follow the habits of a town life. They are to be found, indeed, in very many under that age, but are much commoner as time advances a little and as people get older. They seem to me to form the basis on which, as a superstructure, chronic disease is raised or builded ; and they lie at the basis of chronic bronchitis, recurring rheumatism, recurring pneumonia, gout, diabetes, apoplexy, and cancer. I do not, for instance, believe that there ever existed a chronic bronchitic sufferer who did not also have periostitis of the sternum ; nor does there often exist a sufferer from cardiac disease who does not also have periostitis or periostealgia of the 4th, 5th, and 6th left ribs. And yet where are these conditions described in the text books? The descriptions are conspicuous by their absence. And some, perhaps I should say many, medical men even deny their existence. But they do exist, they exist too surely; and they are the foundation on which, I believe, the chronic diseases, among which must be reckoned cancer, are built up.

Chronic Bronchitis invariably accompanied by periostitis of breast-bone ; and often of ribs.

These perimysitic, perineuritic, periostitic, and tenonalgic affections, I should think, do not exist to the same extent among country dwellers as among the inhabitants of towns. My experience, of course, is almost wholly among the latter, for when country dwellers in this part of England present themselves for advice they almost always, though living nominally in the country, are following the ways and habits of town dwellers, being often engaged in mills and other business pursuits. I do, however, from time to time have to advise countrymen belonging to the farmer class ; and on a recent occasion was much interested in the conditions obtaining in the person of a young master farmer accustomed to ride and drive and to lead an out-door life with abundance of physical exercise, although he had to use his wits and exercise

These affections oftener found in towns than country, because of comparative absence of exercises in former.

his brain quite as much as the ordinary town dweller. He was entirely devoid of any trace of perimysitis, perineuritis, or periostitis. He could bear grasping and firm pressure of all his muscles without flinching; and also pressure over the supra-orbital, infra-orbital, and other nerves, and pressure over the maxillary articulations without experiencing any pain at all. His axillary boundaries back and front, the pectoral muscles, the latissimi dorsi, teretes, and the trapezii muscles, the supra and infra-spinati and the rest could all be moved under firm pressure without causing any pain to their owner. Perhaps there was the slightest tenderness when the sterno-mastoids were moved under pressure, but this was literally the only trace or sign of the affection which I could discover; all the muscles of the lower extremities being firm and elastic and resisting pressure without any suspicion of aching or tenderness at all. Quite certainly that youth could trip and catch himself up suddenly without suffering, as so many town dwellers would do, from aching and stiffness next day or the day after; and no doubt his immunity was due to more exposure to the open air, leading to better digestion of food, so preventing the accumulation of waste matters in the blood, and to an abundance of physical exercise oxidising off any accumulation which might by accident have been deposited in the muscle-sheaths. And no doubt exposure to cold and wet (in fact it was so) did not induce in him those trying rheumatic experiences which town dwellers, though doing all they can by care and warmth to avoid, are still such sufferers from. The town dweller may indeed get into the robust physical condition of my young farmer friend by a combination of dietetic management and muscular exercises ; but this state is rarely attained, and when it is, it is after considerable effort and labour ; while the farmer receives naturally, and as it were as a gift from nature, what the other has to strive for so keenly and for so long a time.

Propositions concerning Cancer.

Now, in studying cancer with a view of arriving at its causes, if possible, several things strike us. In what I have to say, let me observe, I refer to carcinoma or epithelioma. I do not exactly except sarcoma, because I do not know whether what I have to say includes sarcoma. But for the same reason I cannot include it under my observations. In fact, I do not know what are the causes of sarcoma, and shall be more than grateful to whoever can enlighten me. First, then, it does not attack children, or scarcely at all. There were 20,353 deaths from cancer in England and Wales in 1892, and of these only 103 occurred among children under 5 years of age ; and I have already said that only 94 deaths among children occurred in 1893. These facts seem to me to dispose or almost to dispose of the view held by some that cancer is a hereditary disease. If it were hereditary, surely it would appear earlier in life, or at least a larger proportion of its incidence would fall earlier in

It scarcely attacks children : therefore, probably, not hereditary.

life. Inherited syphilis, *e.g.*, appears immediately or soon after birth, and further, it is apt to modify the whole development of the organism, altering the development of eyes, teeth, nose, and limbs. In fact it is probable that no part of the developing or growing organism escapes when a child is affected by severe inherited syphilis, since no part seems to escape its stunting influence. But whether this is so or not, inherited syphilis appears early and modifies the growing organism in more or fewer of its parts.

Some points in the hereditary transmission of disease.

I can understand that a disease which appears early in life may be inherited. If we find a history of syphilis in the ancestors I can even understand our being forced to the conclusion that the disease *must* be inherited; and indeed whether we can find evidence of the parental or ancestral disease or not, I can still understand our being compelled to this conclusion, since we may be able to eliminate the possibility of its being acquired through, *e.g.*, nurses or otherwise. But I confess to finding great difficulty in accepting the proposition that disease appearing, like cancer, after 40 or 50 years of age, is probably hereditary. It seems to me far more likely that it is acquired. When such a disease ensues at such a time of life we have to ask ourselves this question. Is it more likely that what the ancestors did forty, or fifty, or sixty, or seventy years ago (for even when parents have cancer they often acquire it many years after their children are born), is it more likely that what the ancestors did so long ago is the cause of the cancer in the children? Or is it more likely that something which the children have done during their forty or fifty years of life is the cause of the cancer? It seems to me that as a question of probability the latter is far more likely. I can't help thinking that a hereditary predisposition or tendency would probably have shown itself much sooner than that. The organism can be modified for health or for disease in much less time than forty or fifty years; and in much less time than twenty years, or ten years, or even five years. I have seen cases which make me think that one may succeed in modifying patients out of so intractable conditions as rheumatism, *e.g.*, in two or three years, even when they were 50 years of age before coming under treatment. I believe, indeed, that the nutrition of the organism in young people can be modified in a period of time far shorter than this. A few months, and even a few weeks (six or eight weeks occasionally) sometimes suffice to modify the constitution favourably when one has to treat it for chronic disease. If this is so, there can be no question therefore that forty or fifty years is far more than sufficient to account for the onset of cancer (and I should unhesitatingly say the same for twenty years, and even for ten years) in persons who may be found to be suffering from it. In the case, therefore, of a mature person having cancer, whose mother or father also had it, the most likely supposition or explanation appears to me to be that both parent and offspring lived in such a way as to induce it. And the law which appears to govern this set of facts is one which I have formulated elsewhere to the effect that "like causes acting on like organisms in succeeding generations induce like effects." So far as I know this is the chief law of heredity in disease.

Formulation of the chief law of heredity of disease.

Cancer attacks women more than men.

Second.—Cancer attacks women more than men. In 1892 12,806 women died of it in England, and only 7547 men.

Cancer has nearly doubled in a generation as a cause of death.

Third.—I have already said that there has been a vast increase in the mortality from cancer in this generation. In 1868, out of a million deaths from all causes, 18,627 occurred from cancer. In 1892 the proportion was 36,365; and in 1893 37,082.

The increase, however, of Cancer has been nearly as great among men as among women.

But fourth,—The *increase* has been nearly equal among men and women. Although women still die of cancer in a larger proportion than men, the preponderance of the proportion is continually diminishing. In 1868 2743 males died of cancer in England, as against 6137 females. The proportion of women was more than two to one. In 1892 7547 men died of it and 12,806 women. The preponderance of women was only as five to three, not six and seven-tenths to three, as in 1868. The increase of cancer as a cause of mortality among men between the years 1868 and 1892 was 4804, and the increase among women was 6669. Had the proportions of 1868 been maintained the increase among women ought to have been 10,748 instead of 6669, as it really was in 1892. The increase among women is still rather greater than among men, but the preponderance of the increase has greatly diminished, and is, in fact, approaching equality.

Fifth.—Whatever the causes are, they take some years to act, since children are practically free from the disease. And it seems to me, sixth, that the causes of a disease which does not affect children, which take some time to act, and which are affecting men and women almost alike, must be something connected with the habits of the people, and (as the disease is increasing) the causes must be such as are acting more strongly now than they did twenty-five years ago. The sphinx of cancer, therefore, from behind a veil of apparently impenetrable mystery, propounds to us this conundrum. What are the causes of that increasing fatality which does not affect children, which is slow in acting, which used to affect women much more than men, but which is affecting both sexes in proportions constantly approximating to equality, and which are different from what used to obtain twenty-five years ago? An answer rises to the pen which I have no doubt is the true answer; but I will not give it now. In fact, we are not prepared for it, and I should not have allowed the question to be put yet had it not been that I was anxious to finish what I had to say about cancer while discussing the subject. But, in order to find an answer if we can, let me go back to some of the diseases mentioned a little while ago, and which we also saw

The causes, whatever they are, take time to act.

The causes of the increase of Cancer must be some change taking place in the habits of the people.

What change? Answer obvious; but will be given later.

to be increasing in the country. If I am right in thinking that cancer is the culmination of mal-nutrition in tissue, or that it is one culmination of mal-nutrition in tissue, steps towards which are made by other diseased conditions already named, it follows that an inquiry into the causes of these preliminary and simpler diseases may throw some light on the causes of cancer. The argument is that various of the diseases named, viz., in particular, bronchitis with asthma, pneumonia, rheumatism, apoplexy, besides minor ailments, such as tonsillitis, tracheitis, pharyngitis, herpes (the conditions, popularly classed under the general expression "taking a cold," or "taking a chill")—the argument is that these are all dependent on a general condition of blood, which I have called triphthæmia, or the accumulation of waste matters in the blood, whether from imperfection of digestion and assimilation of food or from other causes. If it can be shown, as I think it can, that the commonest form of this triphthæmia is brought about by one set of causes for the most part, then some progress will have been made towards the understanding of these affections, and through them of cancer, and of the causes of its increase. I propose to commence with bronchitis, whose immense increase in this generation I have already instanced. I think the evidence is indisputable—altogether conclusive—that bronchitis is practically due to an excess in the diet of starchy and saccharine or sugary foods. The people who suffer from bronchitis (which accounts

To reach an answer consider causes of other increasing diseases, as Bronchitis.

Exciting causes of Bronchitis may be cold, wet, &c., but predisposing causes are wrong eating, and particularly the over-consumption of starch and sugar.

now for about one-tenth of all the deaths in England and Wales) are the people who live to a great extent on such foods as bread, potatoes, rice-, sago-, and tapioca-puddings, jam, and sugar. The popular opinion that bronchitis is due to cold is true only to this extent, that exposure to cold will bring on an attack of bronchitis in those persons who are predisposed to it by having consumed larger quantities of those foods than they have assimilated. Such exposure will not bring on an attack of bronchitis, or will scarcely do so, in persons not so fed. One of the most striking facts, it seems to me, which goes to show this is that in persons predisposed to it (by wrong feeding, as I contend) an attack is often induced by the effects of heat. The theory then commonly set up is that the person became overheated, perspired perhaps, and then was exposed to a draught, and so "took a chill." It does not follow that the precise time or place where the "draught" occurred can be pointed out. Neither is it necessary to show how the "over-heating" occurred. The person sometimes, it is true, has had some extra exertion inducing free perspiration, but often enough there is no evidence of this brought forward, and too often none is required. Very often the fact that the weather was hot, in the one case, or cold in the other, is all the evidence that is required to account for the attack of bronchitis. The theory is so convenient and so adaptable that one is almost sorry to show any scepticism as to its truth. A theory which accounts

Heat often an exciting cause of Bronchitis.

for the attack of bronchitis, when the weather is cold and damp, and ingeniously also accounts completely for it when the weather is hot and dry, such a theory is not one lightly to be discarded. Nevertheless, in the hard and unsympathetic court of reason it is necessary to examine it, and even cross-examine it. Is not the human organism intended, or if that word is too teleological for the thinking of to-day, is not the human organism adapted to endure both cold and heat and some exertion also? Is it not fitted to live and thrive in hot weather and cold weather, in dry weather and in wet weather, in wind and rain, and in calm also? Or, at least, may not a human organism go on performing its part in life, and performing it efficiently, whatever be the conditions of its environment in these respects? Of course it can. But to admit this implies the giving up of the convenient theory before referred to, that it was the heat or the cold, or the wetness or the dryness, or the wind or the calm which did the mischief. Is it not, in fact, self-evident, when we come to examine the question, that the causes of bronchitis, or the "taking cold," must be in the organism itself for the most part when causes so various induce the same condition of illness? Obviously it must be so. If outer conditions of environment vary, and if yet the illness comes on, it is plain that the organism itself must be the chief cause. When this is seen, and the difficulty comes to be faced, how causes so diverse and even opposite can induce the same condition of illness, refuge is taken in the theory of predisposition, or tendency on the part of the organism to be affected with the disease in question. And even heredity is invoked, or what may perhaps be paraphrased as "predisposition inherited from ancestors," to account for the facility with which one "takes cold." One's father or mother suffered in this way, and so do we. Yes; but the question arises, what caused this state in father or mother? It can hardly be assumed that they in turn got their predisposition or tendency from *their* parents, and so on indefinitely. Surely it began sometime. I believe it begins in any given generation. The question arises, if the father or mother suffered in this way, how did they live? What did they eat? What work did they do? And the same questions arise regarding the attacks in the present generation. How do we live who get bronchitis? What do we live on? Obviously this is a much simpler question to answer than the one: how did our ancestors live? And if we find sufficient reason in the habits of our own life to account for our illness, perhaps it will not be necessary to invoke family predisposition or heredity at all as a cause.

Heredity not the cause even when ancestors had it; the question is, how did they live?

As regards bronchitis, the following experience occurred to me. In November, 1892, a well-built substantial matron of 52 years of age came to me, saying she had suffered for twelve years from what her medical advisers called bronchitis and asthma.

Proofs as to causes of Bronchitis.

She said the attacks were very severe, and were coming on at continually diminishing intervals, and with continually increasing severity. Attacks which used to be three or four months apart were appearing at eight weeks' and six weeks' and even three or four weeks' intervals, and she was becoming worse and worse. The question was, could anything be done for her. This seemed an unpromising problem to attempt to solve in the case of a woman no longer young, who had suffered for so long a time. She was not exactly ill, however, at the time, as she was able to present herself for treatment. On examination she was found to have catarrh of the larynx, trachea, and bronchial tubes, there being sibilus and rhonchus present; and I thought that there were some evidences also of emphysema. The question was, what were the causes of the recurring attacks? Unless they could be obviated other attacks would certainly take place. On inquiry, however, it was quite plain what the causes were. Bread and butter and tea for breakfast at 8.0 a.m.; meat, potatoes, Yorkshire pudding, rice pudding, or jam pudding, with bread for dinner at 1.0; tea, with bread, butter, and jam, at 4.30 or 5.0; and bread and milk or boiled oatmeal for supper at 8.0, constituted the woman's ordinary diet, and in my opinion accounted sufficiently for her attacks. At any rate, considering that she was taking far more carboniferous food than she was assimilating, and believing that the laryngo-tracheo-bronchial mucous membrane was congested and irritated by the excessive work thrown on it in its futile attempt to oxidise off all the waste material carried to it by the blood, I advised an alteration of the diet to three meals a day, and that she should take bread only twice, and jam and sugar not at all. If she wanted any supper, she was to have simply a glass of milk, not bread and milk, nor any oatmeal porridge. She came at weekly intervals for a few weeks. It was a little difficult to keep her confidence, because two or three previous medical advisers had said that the food taken had no influence on the bronchitis. However, she persevered, losing weight under the treatment, but losing also the congestion of her pulmonary mucous membrane.

After the lapse of about five weeks she informed me that judging from her former experience, she might expect to have a new attack, "but," she added, "I am not going to have one." She has not had any attack since. It may be said that the history of this case proves nothing; that the recovery was a coincidence; and that she would have recovered, whatever she had done and whatever food she had eaten. I don't believe this. In view of the facts that she was not young, that she had suffered so many years (no less than about a quarter of her life), and that the opinion that carboniferous foods are to a very large extent burned off in the pulmonary apparatus and mucous membrane is a physiologically correct opinion, and therefore that the excess of these foods consumed was the main cause of the bronchitis, since an excess-consumption of these foods throws too much work on to the bronchial mucous membrane, which becomes, therefore, congested, much in the same way as a fire becomes choked when fed with too much dross—in view of all these considerations I am compelled to the conclusion that the recovery was no mere coincidence, but was really the effect of the treatment. If the case stood alone I might think so, but it does not. The same treatment has relieved many sufferers both before and since. In fact, it fails only in those cases where there is something more present than mere bronchitis (*e.g.*, phthisis), or where age is so far advanced and organic disease has gone so far, that recovery is no longer possible. The evidence for this view is so strong in my mind now that I venture to lay down the dogmatic position that the chief predisposing cause of bronchitis is the consumption of an excess of starchy and saccharine foods. But bronchitis accounts for about a tenth of the total mortality of the country, and, therefore, the inference is that one-tenth part of all the fatal illness in England and Wales to-day is amenable to hopeful treatment; and, further, that by proper dietetic management bronchitis is preventible. This state of opinion is, of course, a very important and very serious one. If, however, we are in the presence of a physio-logico-pathological law of human nature, the principle can be put into operation by others. If it is, I make bold to venture the prediction that the law will be vindicated, and that bronchitis will not only be cured by the inculcation of a suitable diet and regimen, but that it will also be found possible by similar means to prevent it; to prevent it, that is, as a rule (for I suppose there must always be individual exceptions), between the ages of 5 and 65 years.

In the following case, chronic bronchitis, lasting for many years, led on to a severe attack of pneumonia, to which the patient speedily succumbed; but the causes of the bronchitis and of the pneumonia plainly were the same as in the matron just described. Quite recently (in April, 1897) I saw a stout man 54 years of age in consultation with his family doctor. The patient had suffered for years from what his wife called asthma and bronchitis, the symptoms being, a more or less constant cough, with whistling sounds to be heard in the breathing and increase of the cough when he hurried or undertook exertion. The man was a teetotaler (how often, by the way, are effects which are really due to wrong eating, attributed to alcohol. They could not at least be so attributed in the case of a life-long teetotaler). As I say, when we saw the man together he had most severe and extensive pneumonia, and the attendant medical man had justly given an almost hopeless prognosis, too speedily verified in fact. Now what had that man's diet been for many years? I asked the question of his wife, and she told me as follows—He was in the habit of taking tea and bread and butter for breakfast at eight a.m. At dinner (12.30) he would have meat, Yorkshire pudding, bread, and rice pudding. He had abstained from potatoes for some time, because he thought them watery, and that they puffed him up, and tended to make him fatter than he was. (Note here how the public frequently abstain from *one* sort of unsuitable food, but through ignorance, undo, by indulging in others of the same nature, all the good effects of their abstinence. Had the man been as enlightened as to the evils of frequent bread-eating as he was in respect of potatoes, how much better for him would it have been!) Tea at six p.m. of bread and butter and tea. Supper, nine p.m., oatmeal porridge. The plain causes of the chronic bronchitis and of the pneumonia which supervened on it were the bread taken four times a day (twice would have been enough), the Yorkshire pudding, the rice pudding, and the oatmeal, which formed practically the whole of his diet. If he had taken three meals a day it would have been much better for him, and if he had taken two meals, I believe he would have been living now without the help of doctors.

The kind of evidence required to prove connection between treatment and recovery.

The suggestion made by a supposed critic that the bronchitic and asthmatic matron before referred to was on the point of recovering at any rate, at the time I saw her, and that it was, therefore, quite fallacious to attribute her recovery to the treatment, raises the question: What kind of evidence ought to be required to prove that the recovery of a patient suffering in certain ways was due to the treatment, and not to coincidence? Obviously the mere fact of recovery is not sufficient to show the connection between treatment and recovery, because it is known that persons do from time to time recover from ailments to which they have been long subject, and that they do this even when, on the one hand, no special treatment has been adopted; and, on the other, they sometimes unfortunately fail to recover, even when subjected to the most skilful treatment. All that can be known, it is said, in many cases, is that a patient suffering in certain ways was subjected to such and such treatment, and that he recovered. It does not follow that the recovery was the result of the treatment, although it followed its application. The recovery may have been due to something else, and to assume that it was the effect of the treatment, because following on it, is illogical and a fallacy. This fallacy is, of course, well known in the study of logic as the *post hoc ergo propter hoc* fallacy. A process (recovery) may be *post hoc* (after treatment), but it does not at all therefore follow that it was *propter hoc* (due to it). This fallacy is no doubt of very wide application in medicine, so wide, indeed, that it is apt to vitiate many processes of reasoning, and to render invalid the fairest inductions regarding treatment. Still, the very fact that it is so well known offers a certain amount of security against our being confused by it; and, in point of fact, medical men are generally quite alive to its insidious character. But it is not, after all, the only fallacy in medical logic; nor, indeed, is it

Post hoc ergo propter hoc fallacy.

the chief one. I question whether its force has not sometimes been exaggerated. Men talk sometimes as if no canons of reasoning were applicable to this part of the domain of knowledge, and as if the nexus between cause and effect was entirely inexplicable. This is evidently an exaggeration, and may lead to the acceptance of fallacies as great as that which it is desired to avoid. There seems at least to be one fallacy in medicine of much greater power than this. The fallacy of fallacies in medical logic, it seems to me, is not the *post hoc ergo propter hoc* fallacy, but this: That we tend to expect that continuous effects will follow the action or application of continuous causes. The law of the economy, on the other hand, is that "Constant causes, acting on the economy, show themselves, not in constant, but in intermittent or periodic effects." *Causae continuae, vel immutabiles: effectus intermittentes, vel temporibus incertis recurrentes.*

The fallacy of fallacies in medicine.

One ought not perhaps to speak of causes as acting constantly or continuously on the human or on any animal economy. Probably no such thing is possible with a changing organism so constituted and so situated. What appear to be causes acting continuously are not really so, but are, on the contrary, causes which act very frequently or at short intervals of time; and the law of the economy in this respect is, that causes which act frequently or at short intervals of time show themselves in effects which recur at longer and uncertain intervals of time. *Causae, brevibus temporibus recurrentes, effectibus, longioribus et incertis temporibus recurrentibus, sese monstrant.* Amylaceous and saccharine foods taken in excess at short intervals over long periods of time (four or five times a day for weeks, *e.g.*, or months) show themselves, not at first, at any rate, in continuous attacks of bronchitis, but in attacks which occur and recur at much longer intervals, as, *e.g.*, weeks or even months apart. But to expect that because causes are acting day after day, and week after week, and month after month, they will therefore show themselves in effects which must be constantly present, is a far subtler fallacy than the *post hoc ergo propter hoc* fallacy, and may be termed the *fallacy of intermittent effects.* I do not know, indeed, whether it may not on analysis be considered a phase or form of the other. Both, at any rate, have to do with, and are apt to vitiate our conclusions regarding the nexus of cause and effect. Patients (to take an instance of this fallacy of the intermission of effects) often say to their doctor: "I "do not think the causes of my illness can be as you "say, and for this reason; I do this always, but I am "not always ill. You say" (let us suppose) "that "food is the main cause of my illness; but, though "I take always the same kinds of food, I am not "always ill. I have an attack of illness, and then "completely (?) recover." (Is recovery complete,

Causes acting frequently at short intervals manifest themselves in effects which appear at longer intervals and endure longer.

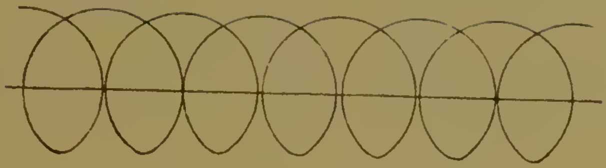
Fallacy of intermittent effects.

however?) "Then, after a time, perhaps several "months, I get another attack, and again recover. "I may make some change in my diet during the "illness, and when in the hands of the doctor, but, "when I recover, I go on to my usual diet and "regimen, and it may be months before I have "another attack." The answer to such common-sense criticism is: Constant causes show themselves, not in constant, but in periodic effects. The diet may be wrong, may even be constantly or recurringly wrong, and even for long periods of time, but its effects are not therefore constantly apparent. Especially in youth, the tendency to recovery is so strong that patients recover from illnesses even when their causes continue to act. They get other attacks, no doubt, but recover even from these, and they go on having attacks and recovering for a long time, even for years in some cases. When the causes continue to act, the attacks of illness tend to come on at shortening intervals, and generally with increasing severity. After a time, no doubt, the intervals between attacks become so short that they tend to disappear altogether, in which case, of course, sufferers are always ill—their disease is truly chronic or long-continued. Even then, however they are not always equally ill; the illness is at one time more pronounced, and at another less so, so that a chronic illness is noticeably periodic before it becomes chronic, and even after it has become chronic, the periodicity of its exacerbations and recessions can be detected by careful and accurate observation. But before this stage is reached, the periodicity of attack and recovery, of invasion and recession, forces itself on our attention without any necessity for accurate or careful observation at all. But the failure to perceive the causal nexus, and the tendency in our minds to expect that, because causes seem to be continuous, effects will be so also, seems to me to be the chief and most subtle fallacy in medical logic.

This tendency of disease to be periodic before it becomes chronic is a very interesting fact in medicine. When thought about it cannot fail to class itself with the tendency of many other events to show periodicity, also; for instance, in politics, ·government by one party in the State is apt to be followed by government by a party holding views more or less opposed to it. In morals, egoism or individualism is very apt to be followed by a wave of altruism or socialism In commerce, periods of inflation are followed by periods of depression, and *vice versa*, and periods of calm and sane prosperity by bursts of insane panic. Even in inorganic affairs the same tendency—or may one call it law?—is noticeable. The tide does not rise continuously, neither does it fall steadily. Both in its rise and fall it moves irregularly. When rising, we see a wave or perhaps two or three waves in which each crest overtops the last one, followed by one or two which do not reach so high, and yet we know that the tide is flowing, because if we wait a little we shall find a wave or two which overtop even that which was the highest some time ago. And so with the falling tide, when we have watched a long recession proceeding for some time, each ebb flowing further out than the last, we are surprised to find one or two waves which do not recede so far, and we may even be tempted to question in our minds if the tide is really receding. But a little further observation settles the question, for in due time a still further recession, followed, perhaps, by one or two still lower, shows that beyond all question the tide is on the ebb. We find, therefore, that although we have movement forward or backward, as the case may be, the movement is not continuous, but is made up of alternate elevation and recession, of alternate advance and retreat. This movement, so noticeable in all these directions, and with special reference to disease in the present instance, has been spoken of sometimes as a movement in circles. As the curves are not equal, I would suggest thinking of it as motion (progressive or retrogressive, as the case may be) in spirals, and further, would say it is a motion not in regular but in irregular spirals. A succession of equal circles cutting each other regularly in the centre might give the *idea* of circular motion, but would be far too regular for even a mathematical representation of natural progression.

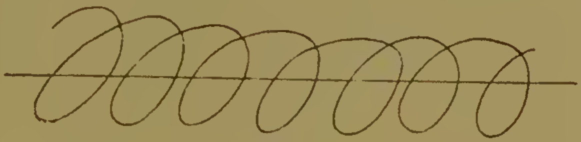
Natural motion not continuous, but marked by leaps and bounds with alternations of recession. Might be diagrammatically represented by zigzag lines, or, still better, by curves or spirals.

Thus—

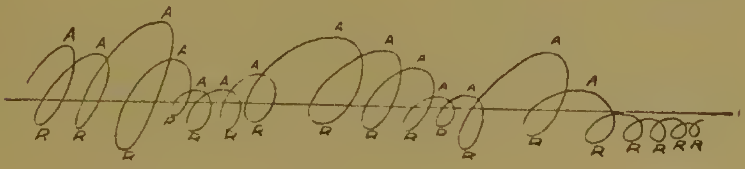


these circles are too regular and too equal to represent the variety and alternation of natural progression.

The spirals here shown are, perhaps, a little more like it.



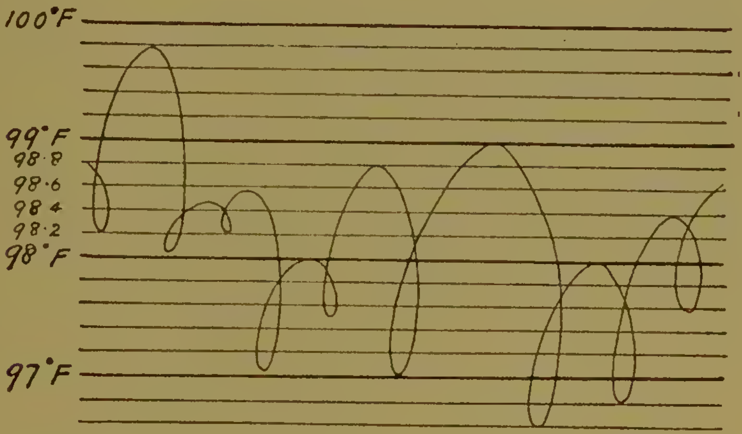
But even these are too regular. And natural motion, the motion of nature, would be more nearly represented by curves or spirals such as those below, whose spirals are not equal either in size or rhythm.



A—Attack R—Recession.

If we suppose the crest, or culm, of the curve to represent the height of an attack of disease, then the various points A would represent these crests. The lowest points, R, where the curves begin again to ascend, would stand for the points of lowest vitality or depression which precede convalescence. It will be observed that the highest points differ in elevation, as so also do the lowest points. Neither are either the sizes of the curves nor their distances from one another equal. If each spiral represents a periodic attack of any disease (bronchitis, *e.g.*), this would mean that the attacks are not equal in severity, and also that the intervals of time between them are not equal. If the straight line indicated the standard of health, it would be found that the early attacks rose well above the line and, before convalescence, sunk well below the line. The later attacks, on the other hand, when disease is becoming truly chronic, indicate very little elevation or depression; but some of the spirals are often found below the standard of health, the prevailing temperature, for instance, in many chronic diseases (as rheumatism, Bright's disease, heart disease, *e.g.*) being sub-normal, or below 98·4°F. Lastly, it may be noticed that the succession of crests and recessions might be diagrammatically represented by a zigzag line, in which case a figure not unlike our ordinary temperature chart would arise. And contrariwise, an ordinary temperature chart, showing the changes of temperature from morning to evening, might be converted into a succession of irregular spirals by joining the culms.

and depressions and filling in the curves. Here, for instance, is a copy of a temperature chart taken after the performance of a slight surgical operation in which the elevations and depressions are represented by spirals in place of the zig-zag points usually shown.



Division of diseases into acute and chronic not logical.

Perhaps I ought to observe in passing that the division of diseases usually made into acute and chronic is not a logical one. An acute disease is a severe disease, and a chronic disease is a long-continued one; but as diseases are often both severe and long-continued, it follows that they are often both acute and chronic at the same time. The division of diseases into acute and chronic, indeed, attributed to Asclepiades of Prusa, in Bithynia, offers one of the most interesting instances of an alleged reform, being really a retrogression, because it can be shown that Hippocrates, who preceded Asclepiades, had spoken of diseases as being mild (πρᾶος) and severe or acute (ὀξὺς), and had also spoken of diseases as being short (βραχὺς or ὀλιγοχρόνιος) and long (πολυχρόνιος or χρόνιος or μακρὸς), so keeping things which were distinct in fact, clear and distinct in his mind and in language. And yet the so-called reform of Asclepiades has held its own ever since his time, displacing the clear and logical ideas of Hippocrates in this particular. In Latin the word *lentus* is often used of the chronic diseases. As *lentus* means *tenacious*, hence *slow*, *sluggish*, hence *lasting*, and as long diseases are generally somewhat mild, there has been no relief to the ambiguity derived from the use of Latin terminology, such, *e.g.*, as the use of the word *mitis* for *mild* or *slight* would have given us.

Suggested definitions of acute, sub-acute, mild, chronic, and brief.

With modern methods of observation we are in a much better position than was either Hippocrates or Asclepiades; and it would be very easy to define the terms *mild*, *sub-acute*, and *acute*, as also the terms *short* and *long*, as applied to diseases, in such a way as to make them perfectly clear, and so prevent their respective meanings from becoming confused as they are at present. An acute disease, for example, might be defined as one in which the temperature rises above 102·5° or 103°F., while the pulse-rate is over 120 a minute. A sub-acute disease or condition is one in which the temperature ranges between 100° and 102·5° or 103° F., and the pulse-rate at from 100 to 120. A mild disease again, is one in which the pulse does not rise say above 100 a minute, and the temperature ranges between normal and say 100°F. to 100·5°F. The per-acute diseases referred to by Galen—who unfortunately defined them in terms of length, and not in terms of intensity or severity—might be taken to mean those states of body in which the pulse-rate is over 130 or 140, and the temperature 104° or 105° and over. The only reason why Galen defined those conditions as diseases which last three days is that such intense fever generally consumes or destroys the organism if it continues for that length of time; but, of course, intensity or severity in disease is a totally different thing from the length of its duration, and ought to have a totally different name and definition.

By *chronic*, on the other hand, is meant a disease lasting twenty-eight days or over. This is the general meaning, or the meaning generally received; but, in fact, chronic diseases—with the phases of exacerbation and recession, which we have seen to characterise them—generally last much longer than this—months, for example, or years. Hippocrates called them *chronic* or *poly-chronic*. By *short* or *brief* diseases—the *brachy-chronic* of Hippocrates—might be defined those diseases which last less than twenty-eight days. In fact, they generally last three or four days, or a week, or up to ten, or twelve, or fourteen days perhaps; being generally pretty severe while they do last. Hippocrates saw this plainly enough, and in one of his aphorisms says that acute diseases can be judged or determined (by the observer) in fourteen days—a most unfortunate expression, as it happens, since it has been supposed to mean that he defined acute diseases as those that last fourteen days, so justifying that confusion between severity and length of duration in diseases which has obtained for so long a time. The words of Hippocrates are τὰ ὀξέα τῶν νοσηματών ἐν τεσσαϱεσκαίδεκα ἡμηέϱησιν κϱίνεται. Here a good deal may turn on the meaning we attach to the word κϱίνεται It seems, however, clear that what Hippocrates did mean was, not that acute diseases were those which last fourteen days; but this, that in fourteen days the observer will generally be able to determine what sort of disease his patient is suffering from, and what the issue is likely to be; whether the continuance of the illness is likely to be long or short, and also whether it is likely to be fatal or otherwise. These propositions are true enough; and in fact we can usually form opinions on these points before even fourteen days have elapsed from the commencement of the illness we may be treating. It must be admitted that Hippocrates was not always quite clear in his language regarding acute and mild diseases on the one hand, nor as to short and long ones on the other (see, for instance, a passage in πεϱὶ κϱισίμων where he says that acute diseases κϱίνονται up till the sixtieth day, after which they become chronic), but his confusion was never so dark as that of the so-called reformer who came after him, and who misled his successors in turn. The remarks made and the descriptions suggested for mild and acute and long and short conditions will, it is hoped, show how a disease may in its course be now acute and then mild and again sub-acute, and that these conditions have no necessary connection with the length of their duration; and they will, I hope, therefore have proved my statement that the division of diseases into acute and chronic is not a logical one.

Why patients recover from recurrent attacks of illness, whether properly or improperly treated; and whether the causes continue to act or not.

The fact that patients recover, and recover again and again from illnesses, *even when the causes of the illness persist* or go on acting, is a most important one in medicine. It is connected with what I have called the fallacy of fallacies in medicine, viz., the intermittent influence of constantly acting causes, or what I perhaps ought to have termed the effects at long intervals of time of causes acting frequently or at short intervals. In fact it seems to be the obverse of that condition of things, since the organism shows only at intervals, or intermittently, the effects of causes acting so frequently as almost to be justly termed constant causes. But this phase of the question explains what is so frequently thrown out as a taunt to medicine and to medical men, viz., that patients seem to do as well (or as ill) whatever is done for them by the medical attendant, and whatever fashion may prevail in medical practice at the time. When it was the fashion to bleed, to cup, and to blister, patients recovered. Even medical men may be occasionally heard to make this kind of observation in terms not too respectful to their art; and the lay public say it with no effort to veil the contempt they feel for the medicine man and all his ways. And they add that when fashion no longer prescribed bleeding and blistering and clystering, but recommended starvation, patients still recovered; and, lastly, they say that now when neither blistering and bleeding, nor starvation is the fashion, but when, on the other hand, efforts are made to "keep patients up" by feeding, &c., they recover just the same. If these statements are true (and they *are* true, more or less, though not entirely) it is suggested, then there is nothing in medicine and medical treatment at all; and that the long-suffering public would be as well without them. True, surgery is excepted. It is not denied that surgery has advanced, and that it has some pretensions to being a science, but medicine—the very idea of science or scientific art is alien to it; so it is said. Now, I have already said that I do not wish to discuss surgery in these remarks; still less do I desire to belittle it. I have had some experience in surgery, and a fair share of surgical success in my time, not less than the average; but I say deliberately that surgery has had very little influence

To except surgery from the general denunciation of medicine is useless, because surgery has not appreciably added to the length of life of the community. Medicine has. Surgery no doubt often very brilliant in special cases, and most valuable and necessary.

in affecting the life interests of the community, although, no doubt, in individual cases its results have been very useful and very brilliant. Will any surgeon say that surgery has, on the average, added even one year to the lifetime of the community? It would be impossible to maintain such a proposition, and it therefore follows that surgery (even granting that it *is* the practice of a scientific art) is of very little moment indeed as compared with medicine in affecting the well-being and the length of life of the whole community. When, therefore, surgery is excepted from the sweeping denunciation and obloquy meted out to medicine, the exception is of comparatively little moment. The art medical, as a whole, is still depreciated; but to what does the denunciation of medicine amount? Chiefly to this, that those who denounce it have not seen the law that constant causes acting on the economy show themselves not in constant, but in intermittent effects. And of course they have been unable to understand how patients recover from acute or severe diseases (or succumb to them on the other hand) rather by the inherent power of the organism to right itself; rather by the inherent power of the organism to return to more or less stable equilibrium after disturbance, than by the methods of treatment to which it has been subjected. It does not even in that case follow that treatment is without influence; for undoubtedly the organic powers may be husbanded by good treatment, or they may be dissipated by bad treatment; the patient may be partially poisoned by wrong feeding or by alcohol, or he may be damaged by blistering, bleeding, or purging, or partially narcotised by opium. But still the proposition holds true in the main, that treatment (unless of course it is outrageously unreasonable) has comparatively little influence in acute diseases. But acute or severe diseases are often single attacks in recurrent diseases; and recurrent diseases are often in their way to becoming chronic. Will any one maintain that treatment is of no value in chronic disease? That treatment, being good, cannot lengthen the intervals between recurrent attacks? or that it cannot diminish their severity? or that treatment cannot rid a patient altogether of recurrent attacks, say, of headache, or asthma, or bronchitis, or influenza? Or will any one seriously argue that treatment is not bad if it fails to lengthen the intervals between such attacks? Or if it does not diminish their severity? Or if in certain cases it fails to abolish them altogether? And is treatment not to be blamed if a patient loses his life at middle-age, when the medical man had a fair chance to help him out of his difficulties? While, therefore, the proposition is true that in the acute diseases the organism tends to recover by its own inherent power even when the causes of the illness persist, it does not, therefore, follow that treatment is of no avail, nor that it makes no difference what kind of treatment a

The power of medical treatment tested rather in the management of chronic and recurrent diseases than in that of the acute and short.

patient is subjected to. But in recurring and chronic diseases, on the other hand, it makes all the difference in the world whether a patient is skilfully handled or otherwise. And the tests of skill in these diseases are contained in the answer to the questions, Did the patient have subsequent attacks? Were they as severe? Were they as frequent? The test of skill is hardly contained in the answer to the question Did the patient recover from a single attack? In other words, we may put our proposition in this rather paradoxical form. The test of skill in medical treatment is not recovery, it is at least not immediate recovery from a single attack of illness; because the organism will recover, whatever (within some rather wide limits) we do or do not do for it. On the other hand, the test of skilful treatment is undoubtedly *remote* recovery though it is not *immediate* recovery. I hope, at least, that the discussion of these points has emphasised the importance of remembering that patients often recover from illnesses even when the causes persist, and that causes acting frequently and at short intervals of time show themselves, not so much in illnesses recurring at short intervals as in those occurring and recurring at longer intervals.

The tests of skill in treatment of recurrent diseases. Does patient get subsequent attacks? As severely? As often?

This principle it is, too, which is the reason for the important principle or canon of treatment, that persons subject to recurring attacks of illness ought to be treated during the intervals rather than during the attacks. Galen, indeed, saw this when, as

Persons suffering from recurrent attacks of illness should be treated in the intervals, rather than in the attacks.

epitomised by Andreas Lacuna Secobiensis, he says *administramus remedia, quum morbus non adest, sed futurus timetur*—we administer our remedies during the interval rather than during the attack: or, when in his own words he says *εἰδὲ ἀκμῆς παρούσης τῶν νοσημάτων οὐκ εἰσὶ καίροι τῶν βοηθημάτων, καὶ μὴ ὄντων νοσημάτων εἰσὶ καιροὶ βοηθημάτων φανερον, ὅτι οὐκ ἐπινοίᾳ μόνον ἀλλὰ καὶ ὑποστάσει διαφέρουσιν.* It is because the organism recovers from severe illnesses by the rebound of its own vital powers that this principle is true; and the ancient master of medicine could not fail to perceive it, although unfortunately his modern successors have not kept it so clearly in view as they might have done. The severity of attacks of illness is proportioned to the extent or magnitude of the exciting causes on the one hand compared with the resistance of the organism on the other, or what we. may call perhaps its predisposition. And predisposition is in turn determined rather by the previous and long subsisting relations between the economy and air, food, and exercises, than by the inheritance transmitted to it by its predecessors. Predisposition in adult life depends far more on personal management than on our ancestors, far more on acquired than on inherited characters.

What has been said regarding disease further shows us how attacks are periodic before disease becomes chronic, and how, even after disease has become chronic, periodicity can be detected in its aggravations and recessions. On the other hand (and this is quite as important as the other consideration), when a patient is in course of recovering from a chronic illness, the recovery is not as a rule continuous any more than was the onset of the illness. There is a period of recovery and then a period of relapse. We know that the patient is recovering because the intervals between the attacks are lengthening; or perhaps because the attacks themselves are less severe, when they set in. If we find the intervals lengthening *and* the attacks becoming less severe we may be quite sure that the patient is recovering, although we are often justified in inferring recovery from the presence of only one of these conditions, either from lengthening of the intervals between the attacks or from diminution in their severity.

The correct treatment of recurring illnesses is often followed by a few very severe attacks of the illness.

There is another thing which perhaps ought to be mentioned. When we commence the treatment of a chronic disease (very frequently, as we have seen, a periodic disease), when we have directed attention to its causes, and have altered them so far as we can, the first thing to happen, say, in a few weeks after these changes have been made, and when we are looking for improvement in the patient's condition, is that he has, instead, an attack more severe than perhaps he has ever had before, or more severe than he has had for a long time. In this case both patient and doctor are apt to be discouraged and tempted to think that the treatment has not been directed on right lines. But this does not follow. The increased severity of the attack is the effect, not of the treatment but of the previous long continuance of wrong conditions. Effects in medicine are remote from their causes. It is not what we do to-day that makes us ill to-morrow. In particular it is not the starchy and saccharine food we consume to-day which gives us bronchitis to-morrow. It is the repetition of it day after day, and perhaps week after week, or even month after month previously, which by its cumulative effects produces the illness. Few of us appear to be able to see so far as this. In point of fact, the illness is a beneficent attempt of nature to rid herself of the waste matter which has slowly accumulated in the blood and tissues for a long time. In the highest sense of the term, the illness, bronchitis, rheumatic fever, influenza and pneumonia, or whatever it be, is salutary; as we may easily perceive if we reflect that usually a long period of health follows on the early attacks, and this even when, being ignorant of the causes, we allow them to re-accumulate after it. So in the case in question, it is not the diminution of the starch and sugar which has caused the disappointing attack of bronchitis; but it is the slowly accumulating effects of the previous consumption of too much starch and sugar. (This, by the way, is, not improbably, the explanation of what is often called the cumulative effects of remedies on the body.) These, acting over a long time, have modified the organism so that it has (as far as possible) become habituated to unsuitable conditions ; and when these are altered to those of health, the organism has to become re-habituated to the new conditions. It cannot do this all at once. There is a struggle, consequently, between the old unhealthy conditions and the new ones, though they are more suitable to health ; and the most usual translation or expression of this struggle is a severe attack of illness of the kind to which the patient has been subject. The explanation may, of course, be simply that the long continuance of improper conditions was bound to result in an attack of illness sooner or later, and that it has come now. I think myself, however, that, in whatever way it comes, or whatever may be the exact explanation of the fact, the attack of illness seems to come earlier where treatment has been commenced than if we do not interfere. So frequently at least have I seen this occur, even when the remote result of treatment has been perfectly successful, that I am in the habit of warning patients that we may have to deal with one or more severe attacks of their customary illness before improvement sets in, and that it is most important therefore not to lose heart.

Canon for treatment. If recurring attacks shew themselves, look for a constant cause.

One implicate of these considerations is the canon that emerges when considering the causes of diseases, and may be thus expressed. "If we find recurring attacks of disease, we should look for a constant cause." Is it a question of recurring attacks of dyspepsia, of bronchitis, of rheumatism, of influenza, of endometritis, of "ovarian neuralgia" (myalgia?), of erysipelas of the face, of nephritis, or of any other disease? Then we may be sure that the cause is constant, and it is the business of the doctor to find it out. Nor is this so difficult as at first sight it seems to be; for probably the cause (the main or chief predisposing cause, that is, for causes are always multiple) is some improper relation between the economy and its environment, some imperfection or some abnormality in the reaction of the economy to air, or food, or work, or physical exercises.

Further difficulties connected with the post hoc ergo propter hoc fallacy.

There is one phase of criticism of the sort I have been discussing, to which I ought further to refer. Supposing that the woman referred to, in place of having suffered for twelve years from recurring attacks of her malady, had presented herself for treatment after or during her first attack. She did send for a doctor when in that condition. Now, supposing that medical man had said—"The "cause of your malady is mainly an excess of "carboniferous foods—diminish these and you will "have no more attacks." Let us suppose further that the advice had been taken and that the patient had remained well. If, further, the medical adviser had quoted that as a case showing the connection between bronchitis and carboniferous foods, the critic would have been able to say many things. As first, it was by no means certain that the woman would have other attacks; many people have one attack of bronchitis, he would have said, and no other for years and years; she recovered in the ordinary course of nature, and she would probably have recovered under any reasonable treatment, and whether she had diminished her consumption of carboniferous foods or not. The critic would have been at a great advantage in that case; for although the medical adviser might have shown even unusual insight in concluding that the attack was the first of a series and not a mere separate or single occurrence, there could have been no evidence, at least no convincing or satisfactory evidence, for the correctness of his view, nor therefore for the value of his treatment. In that case the public might well ask, "Who shall decide when doctors disagree?" And yet one doctor would have been right and the other wrong, although he who was wrong would probably have been able to convince even a jury of qualified colleagues of the truth of his opinion, and to have carried by a large majority a vote in his favour in a medical society.

Such inquiry as has been made into the law of the continuance and recurrence of disease on the one hand, and its recession on the other, has thrown some light on the subject, and has put us in a better position as regards the critic. It does not lend any colour to his suggestion that the bronchitic and asthmatic attacks referred to were about to cease, at any rate. The opposite was in fact more likely. The causes of the attacks were continuing, and therefore further attacks might have been expected. It is not the rule that attacks of illness which have been recurring for some time should suddenly (or even gradually) cease. It is the rule rather that they should continue to recur. If they cease suddenly, the probability is either that some change in their causes has taken place, or that some new phase of the illness may be expected to ensue. Changes in the direction of cessation or of diminution in the causes will, as we have seen, show themselves rather in a diminution in the severity of the attacks and in a lengthening of the intervals between them than in their sudden and complete cessation (there may perhaps, as has been said, be one or two very severe attacks before improvement sets in). In the case in question the attacks of bronchitis and asthma were not only diminished in severity and frequency—they were made to cease altogether — more suddenly, it is true, than had been anticipated. But the improvement, whether coming suddenly as it did, or more gradually as had been rather expected, had been confidently predicted as the result of the treatment, and although, perhaps, the prediction may have sounded hazardous and even arrogant at the first interview, its terms were more than fulfilled. Although expecting the improvement to be more gradual, and perhaps that the woman would have one or more very severe attacks before it fully set in, still I can have no doubt that the recovery was due to the treatment, that it was *propter hoc* and not merely *post hoc*, that it was due to the advice she got, and not to mere coincidence. We may doubt the existence of a law of nature until we have seen it in operation. But if after seeing it in operation, we have an opportunity of making circumstances in which its scope and influence may be felt, and if then we find our prediction as to its effects completely verified, our belief in the existence of the law becomes much stronger, and becomes indeed a conviction. This is what happened in the case in question. I had seen, or thought I had seen from other cases and from physiological evidence, that an excess of carboniferous saccharine and starchy foods is the main cause of bronchitis and asthma (which is very often œdematous bronchitis, due to the growth of saccharo-myces in the bronchial mucous membrane? A kind of swarming of the bacillus there?) I confidently predicted that if that excess of these foods was removed the patient would recover; the excess of these foods was removed and the patient did recover, after having suffered for twelve years. No other change was made in her surroundings or habits. As to cold, the alleged cause of her suffering, she was told she need not mind it particularly, but that did not prevent her recovering in accordance with the prediction. What further evidence can we have in this life and with our limited powers over nature than this? I can have no doubt as to the causal sequence of treatment and recovery, especially as in similar cases before and since I have been able to obtain similar results.

I have asked, what further evidence can we have? Well, there is further evidence possible. Put that woman back again under the old conditions. Let her return to her bread and to her sugar, to her rice, sago, tapioca, and Yorkshire puddings, to her potatoes and to her jam, to her bread and milk—or oatmeal—suppers. Let her do this and she will have her bronchitic and asthmatic troubles back again in a few weeks or a few months. I do not recommend the performance of this experiment, but I know very well what the result will be if it is tried. And, of course, nature being above and beyond us and comprehending and governing us all, will yield the results to all who care to put themselves into proper conditions; and what has been done in one case may be done in any which is similarly circumstanced.

If bronchitis is due to an excess of carboniferous foods it ought to be possible, since bronchitis is growing very much as a cause of death in England, to show that these foods are being consumed to a greater extent now than formerly. I do not myself doubt that this is so. Still it is a very difficult thing to prove. I think there can be no doubt, if the habits of the average members of the community are examined, that they mainly live on a diet of bread, potatoes, puddings, and sugar. In the case of bread, they have emasculated it and deprived it of its sustenance by removing the outside of the wheat grain in what is called refining the flour. When people live, as so many do, on a diet of white bread and tea and sugar three or more times a day, it is no wonder if they look pale and pasty-faced, and if they keep continually taking "colds." One has often been struck by the pallor of the operatives returning from work in the mills when many of them can be seen together, and their undernourished appearance forces itself on our attention. Perhaps some of this appearance is due to confinement indoors, and yet mill owners are now compelled by law to ventilate their premises better than they used to do, and many mills provide a larger amount of air-space than the workpeople can obtain in their own houses. I cannot help thinking that a great part of the cause of this unhealthy appearance is the white bread and butter and tea diet which these people live on for economical reasons often three times a day. It does not seem possible to prove from the Board of Trade Returns how or to what extent the consumption of carboniferous foods is altering in the country. So much depends on the amount of the home crop, *e.g.*, of wheat, potatoes, &c., that it seems impossible to discover from this source how the diet of the people is altering. One thing certainly is very striking, and that is the large increase which seems to be taking place in the consumption of sugar. In 1866 there were retained for home consumption in the United Kingdom 41lb. of sugar,

Consumption of sugar in the United Kingdom raw and refined, for each person in the population. In 1871 the corresponding figure was 46lb. per head per annum. In 1876 it was 58lb. In 1881 it was 57lb. In 1886 it was 66lb.; and in 1892 it was 77lb. per head per annum. Too much weight should not, perhaps, be attached to these figures, because since 1874, when sugar was admitted free of duty, the amount used per head of the population includes the proportionate amount of raw sugar, refined and re-exported. But still, I think there can be no doubt that the consumption of sugar per head of the population has greatly increased in recent years. There seems to be a greatly-increased quantity of jam consumed. The trade in that and in sweet-meats seems to have grown to great proportions in recent years. And one is struck in travelling by railway, for instance, to see the quantities of sweet-meats consumed, whether by the elegant young lady who eats them out of her bon-bon box with a pair of tongs, or the mill girl who pulls them out of the plebeian paper bag. All classes seem at least to think that their strength can be kept up and they can best meet the labour of travelling and of walking by the free consumption of sugar.

Increase of meat consumption probably not the cause of the increase of Cancer.

It is customary to point to the increase in the consumption of meat in England in recent years. The quantity imported has no doubt greatly increased. I do not think it is worth while to quote the figures, because there is no means of comparing the quantity of home-grown meat consumed with that of foreign production. But even if it be that the consumption of meat per head has increased of late years (and I do not know whether this is so or not, though it seems probable on the whole), the increase is not nearly so great as the increase in the consumption of wheat, and flour, and sugar, so that it seems as if the increase in the consumption of the carboniferous foods was very much greater than that of nitrogenous foods. But any one can see for himself how highly carboniferous the English diet is by running it over in his mind. Bread and butter, with tea, for breakfast (with or without bacon or eggs). Dinner at one, of meat and potatoes and pudding—little meat and much potato and pudding—with bread. Afternoon meal of bread and butter again and tea, about four; and supper of bread and cheese and beer, or perhaps oatmeal porridge, at eight. Let any one realise of what this diet consists, and he will see how much labour it compels the bronchial mucous membrane to do in order to oxidise it off, and what great likelihood it involves that congestion and inflammation will be set up in it, and how certainly bronchitis and broncho-pneumonia must be among its consequences. Many domestic servants also insist on having a cup of cocoa or tea or coffee, with bread and butter, at eleven in the forenoon, so that these women are eating bread, and mostly white bread, no less than five times a day. The marvel is, not that they should suffer from dyspepsia, anæmia—triphthæmia rather?—rheumatic fever, and frequent colds, but that they should ever be well. The mistress dare not suggest the reduction of meals to three in the day, and when the doctor does so he is not listened to.

So far, I have considered the connection between bronchitis and carboniferous foods. I think there can be no doubt that bronchitis and asthma are due (as their main or chief predisposing cause, though not of course their chief exciting causes) to the ingestion into the economy of larger amounts of carboniferous foods than are assimilated. These foods being to a large extent burned off in the mucous membrane of the lungs, that structure, accordingly, becomes congested and inflamed because it has too much work thrown on it. When the inflammatory action spreads to the submucous tissue and to the air-cells, broncho-pneumonia arises; the "cold" is more severe, and the patient may be compelled to go to bed. With an ordinary "cold," *i.e.*, slight inflammation of the mucous membrane of the upper part of the windpipe, or of that of the bronchial tubes (*Tracheitis* or *bronchitis mitis*, or *lenta*), he generally manages to go about, and the "cold" works itself out. But if, as so often happens, a chronic congestion of the mucous membrane and of the sub-mucous tissue has existed for some time, a sudden increase of these conditions may occur, the inflammatory action may spread to the air-cells, and a sudden attack of what is called pneumonia may set in, at once placing the patient in extreme danger. Very often there is severe headache and pain in all the limbs with fever, lasting for a day or two, after which the pneumonia declares itself; and the whole condition is then called influenza, accompanied by pneumonia. Before we became accustomed to look for influenza in 1891, it seems to me we used to call these conditions bronchitis, broncho-pneumonia, and pneumonia—in popular language "a severe cold," or "a severe feverish cold." No doubt the infectious character of influenza is striking, while bronchitis has not been so much considered an infectious disease. And yet how common it is, and was, to see "colds" starting with one member of a family and attacking one person after another in the household, till almost every member of it had suffered. Since 1891, it seems to me, we have had the infectious character of these affections forced more on our attention than formerly; but the minds of most practitioners, I think, must always have been impressed by the infectious character of "colds." This character had at least always been associated with severe "running colds in the head," as they have been called. In such cases the spray of vapour given out at each cough or sneeze may easily be supposed to set up similar action in a neighbour when lighting on his mucous surfaces, and when carried in by the air entering his nostrils. And even when the cold is not characterised by the same free

How Pneumonia and Influenza-with-Pneumonia depend on an excess of starchy and saccharine food.

expulsion of watery vapour, it may readily be conceived that particulate matter given off by the breath of a person suffering from influenza may enter the respiratory tract of a neighbour, and there set up a similar action. Especially will this be the case if the respiratory mucous membrane of that neighbour is already in a congested state, with its resisting power therefore weakened. This congestion and weakened resistance is brought about to a large extent, as we have seen, by the consumption of larger quantities of carboniferous foods than are assimilated ; so that it comes to this, that the persons who are most susceptible to the influence and to the infection of influenza, are exactly those who live largely on bread, potatoes, puddings, and sugar. From my observation I should say that those are just the persons who get it, and that when we hear that a person has had influenza several times, five or six or seven or more times as some are said to have had it—and when in obedience to the canon which we formerly saw to obtain, we look for a constant cause for these recurring attacks, we shall find that the diet of those people has largely consisted of one or more of these foods. I am sure from what I have seen that this is so. Although both sexes suffer from influenza, still it is on the whole the women rather than the men who suffer from the *repeated* attacks that are under consideration now. The only reasons for this are that women consume these foods on the whole to a larger extent than do men, and that women place themselves under the influence of methodised exercises as a rule to a much less extent than men. If these considerations are so (and it seems to me that on the whole they are true to nature), it appears to follow that influenza is a preventible disease, and that no one, or hardly any one, need have it (infection or no infection), a conclusion which, I must say, is quite clear in my mind. Of course a period of preparation, and even a long period, may be required to alter the constitution of susceptible persons, so as to render them insusceptible; and the longer must that period be, the longer the predisposing causes have acted previously. But as the predisposing causes of influenza seem to be an excess of carboniferous foods, and the absence of methodised movements, the translation of this abstract proposition regarding the altering of the constitution resolves itself into this, that we must diminish the amounts of carboniferous foods consumed, and prescribe exercises twice a day, in order to render persons insusceptible to take influenza. That the alteration of constitution can be effected I have no doubt, under 45 or 50 years of age at least, though it may take a long time to do. Constitution being the resultant at any and every moment of the interaction between the economy and its environment, that is between the economy and its air, food, and movements; it follows that the constitution can be slowly changed by altering its relations to these three things. Reasoning of this sort enables us to

Influenza a preventible disease.

Definition of "Constitution."

translate predisposition, which has hitherto been so mysterious, and even metaphysical, a consideration, into terms of the action on the economy of air, food, and exercises, or movements. According as the economy is properly or improperly managed in respect of these three things does its resistance become greater or less. Predisposition in one word seems to resolve itself into resistance. Or one ought perhaps rather to say; predisposition is the opposite of resistance: it is inverse resistance. It seems a mere play upon words to say that no one can suffer from any ailment who had not the predisposition to do so; and yet a great writer has delivered himself of this truism as regards the acquisition of physical characteristics. If the resistance of the organism to the poison of influenza (or to any other influence) is great, then predisposition is small or slight. If, on the other hand, predisposition is strong, then resistance is slight. Predisposition and resistance seem to be inversely as one another, the greater the one the less the other, and the less the one the greater the other. If health is maintained by proper management, then the economy is able to oxidise off and to resist without illness a much larger amount of the poison of influenza than if the air it uses is foul, the food it consumes is unsuitable, difficult of digestion or innutritious, and the movements it performs insufficient or excessive, or not properly methodised. If health is at a standard sufficiently high as regards these

Definition of "Predisposition."

conditions, it seems as if the poison of influenza would or might have no effect at all. In other words, influenza might thus be prevented. It seems to me a great step forward to have seen our way to the conclusions, first that bronchitis is both curable and preventible, and now that influenza is preventible, while even its infectious character can be modified, since if we do not possess on the one hand the congested mucous membrane, which is due to wrong eating, nor on the other the congested muscular-sheaths, which are due to this cause and the absence of methodised exercises, we shall most probably prove insusceptible to the disease. The person who attends to these things need not, I think, have any fear of catching influenza; but if he does, it will probably prove so trivial that it matters very little whether he takes it or not.

While dealing with the term "Constitution," and giving it the definition suggested, perhaps I ought to draw attention to two other words often used in this connection, and to attempt to define them. I mean the terms "Diathesis" and "Heredity" or "Atavism." Evidently there are three natural divisions of the causes which may affect the state of an individual. There is first the present condition, which is what I have wished to denote by the term constitution. The constitution of an individual is the state at any moment resulting from the changes produced by the interaction between the individual as he started at birth and his circumstances or environment up to the time at which his state is being considered. Each change in environment alters the organised being. As the environment is always changing (in the element of time if nothing else) it follows that the constitution is always changing. With each alteration of environment the constitution shows a new condition, a new mobility, a new state.

Definition of Atavism or Heredity.

But by the term "Atavism" or "Heredity" we refer to the influence which his progenitors have exerted on the individual. It is evident that this (unlike constitution, which is changing every moment with each change in environment) is fixed and determined.

The constitution of our ancestors.

Ancestors while they lived were no doubt always changing with the changes of their environment, just as ours do. But when a new individual comes into the world, the modifications which his ancestors have exerted on him cease. Whatever these modifications are or were that they remain. Heredity or atavism is the state of the individual as determined by ancestry. Constitution, on the other hand, is the changing state induced by his own circumstances, particularly his relations to air, to food, and to exercises. The former is fixed and determined. The latter is continually changing as the environment changes. Atavism probably determines, or is one of the factors which go to determine, the development and organisation of the descendants. Organisation is undoubtedly inherited, or some part of organisation is undoubtedly inherited. That one man should, when full grown, measure 5ft. 9in., and another

Atavism goes to determine organisation. Does it go to determine Disease?

man only 5ft. 6in., is one of the facts into which atavism probably or almost certainly enters. The colour of hair and eyes and the general appearance, gait, &c., are probably also largely determined by the same cause. We cannot overlook or fail to recognise facts so noticeable as these. But it is a question, for instance, whether an organism which, under favourable conditions, would reach a height of 5ft. 9in., might not, under unfavourable conditions of feeding, &c., fail to reach more than 5ft. 8in. or 5ft. 8½in. The organisation which is transmitted or inherited can apparently be modified by conditions of environment. The child of a microcephalic idiot whose brain weighed only 2lb. would be very unlikely to possess a brain which weighed 4lb.; and if both parents were microcephalic, it would be in the highest degree improbable that the children would have well-developed brains of normal size and weight. This would be a fact of organisation, as I should express it, not exactly of disease; for though such a brain would be small and incapable of normal human intellection, still it might be healthy and sound so far as its powers went. I suppose that the dwarfs described by Stanley in his African journey would be human beings, though no one would expect to find among their descendants individuals equal to the normal human standard; and yet, as among other tribes of the human race, some members even among the dwarfs would probably be taller than others. In a wide and comprehensive sense, humanity may be said to be transmitted or inherited ; and we see humanity to be well demarcated from the bovinity, or caninity, or felinity which characterise other orders of animals. But the question which interests us from time to time in the course of this inquiry is rather the inheritance of disease than of organisation. And it will be seen that the view which has forced itself on the writer is that disease is transmitted very rarely indeed, so rarely that while possibly 10 per cent. of the disease one sees may be due to inheritance, certainly at least 90 per cent. is acquired. I think, indeed, that it is impossible to believe that even 10 per cent. of the disease which one sees affecting persons in adult life can by any means be due to inheritance. I mention that as an outside proportion, one beyond which inheritance of disease cannot possibly extend, and believing that the proportion is, in fact, much less. I hope to return to this point later.

Definition of Diathesis.

But there is another natural division in the life history of an individual, and that is his state during the intra-uterine life, that is, from the moment of conception till birth. To this I propose to confine the term diathesis. I have known cases in which facts occurring during the intra-uterine life had an important influence on the individual. To go no further, premature birth is admittedly a damage to a life, and a danger to the rearing of a child. And supposing the difficulties and dangers of that time to be overcome, it is conceivable that a person may be left weaker or with less vitality than if he had not had to contend with them. Of course diathesis, in this restricted sense, runs into and becomes continuous with constitution, since at the moment of birth diathesis ends and constitution begins. Like atavism, however, diathesis is fixed and determined at birth. It may be modified for a very short time, while atavism cannot, or its effects can be modified only a very little. But constitution can be modified as long as life lasts. These uses of these words, it may be said, are arbitrary; but the states pointed to by them are real and natural. It is no doubt true that the three terms are loosely used as more or less synonymous with one another, but this leads to confusion in thinking, if, indeed, the loose use of the terms is not caused by confusion of thought. As we have three terms in common use, and as we have three natural states to be named, it seems to me it would be well to confine our terms to the meanings suggested, so that we should clearly know when each term was used what was meant by the word. If these uses are objected to, better terms should be proposed.

Infectiousness from case to case; or as successive effects of a common cause.

Perhaps a word may be permissible regarding the infectiousness of "colds" and of influenza. The observation applies to infection and infectiousness in general. It is this: that we assume too readily that a number of cases of illness occurring simultaneously, or at short intervals after one another, are caused the one by the other; while, in fact, they may be induced by a common cause. For instance, a number of cases of influenza may, each of them, be set up by exposure to cold (or heat, for these cases are common in hot weather), acting on persons whose bronchial mucous membrane is congested by improper feeding in the way suggested, and this in case after case; or they may be induced the one by the other by the passage of the infecting bacillus, or whatever the cause may be. Inasmuch as the members of a household live similarly, we can see how a predisposition to take influenza (or any other affection — bronchitis for example) may have been induced in all its members, and can hence easily understand how person after person might suffer, even although the one did not affect or infect the other. The different cases may have been successive or concomitant effects of a common cause, as well as cause and effect of one another. The danger, however, of confusing causes and effects with the concomitant or successive effects of a common cause is one which is always present with us in medicine, especially as regards the incidence of infectious disease. A number of persons in a household may, for example, each of them be poisoned by sewer gas which, let us suppose, enters the house and infects each person in turn with diphtheria; or, the first case, having been so caused, may have caused the second case by direct infection, and the second the third, the third the fourth, and so on. And it is possible, nay, I think it likely, that even the predisposition to take the disease at all may have been brought about by improper feeding, so that, even with the ingress of the sewer gas the family might have escaped, had the members of it been differently managed as regards food and methodised exercises. Food and exercises could thus act powerfully in modifying the resistance of the organism, which indeed they no doubt do.

The predisposition to Rheumatism and to Anæmia also due to excess of carboniferous foods.

Now it seems to me that rheumatism and the condition known as anæmia are other phases of the effects on the economy of a super-abundance of the same carboniferous foods as caused bronchitis, severe colds, influenza, broncho-pneumonia, and pneumonia. These named affections, as has been seen, appear to be rather direct or immediate effects of the over-consumption of these foods, while rheumatism is its most striking indirect or remote effect. Bronchitis and rheumatism appear to me to be different phases or manifestations of fundamentally the same condition. When the carboniferous foods overload the economy, an early and common effect is to set up bronchitis and broncho-pneumonia, and so we see the tendency to "take cold" very marked in childhood and early life. But so we do with rheumatic fever, which seems to me to be occurring more often in childhood and early life than it used to do. On the whole, however, rheumatism seems to occur later in life than the susceptibility to "take cold." And yet it is astonishing how common is the muscular tenderness which I have described, to be found among young children when examination is made for it. I have found it at least at all ages after seven or eight, and I may add (what might indeed have been anticipated) that it is much more quickly responsive to treatment in children than when occurring in older persons. Slight alteration of the diet and the prescription of well-directed exercises generally suffice to get rid of it in a short time. As time goes on the tissues become harder and firmer, and more capable of sustaining both exertion and exposure than at more tender ages. If, in the habits of life, a larger amount of carboniferous food is taken than is consumed, the blood comes to be loaded periodically after each meal with an excess of the products of these food-stuffs. In due course the blood is laid out on the extended curvilinear surfaces which form the muscle-sheaths, the nerve-sheaths, the brain- and cord-membranes, the periosteum, the synovial sheaths of tendons and joints, and the joint ligaments, for the purpose of nourishing these tissues. When this occurs, these flat or extended surfaces not only receive nourishment from the blood, however, they act as filters and receive from it the waste material floating in it. It is in fact a very favourable circumstance that they do act in this way, since they thus act as purifiers of the blood, which is therefore sent on to do its work for the nutrition of vital organs in a better state than if it had not been relieved of its waste in this way. But this process explains the existence of such conditions as muscular rheumatism, facility of fatigue (for how can waste-laden muscle-sheaths work long and smoothly?), neuralgia, neuralgic and periostitic headaches, periostitis, and by-and-bye joint stiffness and joint thickenings. One of the most striking facts which go to show the relation between bronchitis and rheumatism is (what I have mentioned before) that periostitis of the sternum (and often also of the ribs) is invariably present in sufferers from chronic or frequently recurring bronchitis. And, as might have been anticipated, whenever our eyes are opened to the relations between the two affections, we find that persons who are subject to chronic bronchitis are also subject to attacks of rheumatism, and are apt to spend their time suffering, now from a severe cold and then from rheumatism.

Another of the conditions often arising from the same causes is the state known by the name of anæmia. It is found mostly in young women, although not by any means unknown among men. The main reason I believe that it is commoner among young women than among men is because of the differing habits and differing tastes of the sexes as regards food and exercises. As I have said, I think *triphthæmia* would be a better name for it, *triphthæmia carbonifera?* perhaps if we gave it its full name. (Perhaps I ought here to say in parenthesis that I do not exclude the existence occasionally, still less the possibility, of the occurrence of a *triphthæmia nitrogenosa*, due to an excess in the blood of waste

Connection between Rheumatism and Anæmia through Triphthæmia Carbonifera.

products from the over ingestion and mal-assimilation of nitrogenous foods. But I am now pointing at what I believe to be far the commonest form and cause of *triphthæmia*, the *triphthæmia carbonifera*).

Anæmia a rheumatic affection. Might be called Triphthæmia Carbonifera Chlorotica.

The variety of it most commonly met with in early life might be called *triphthæmia chlorotica* from the greeny yellow complexion so often shown by these young people. In later life, when the causes of the condition have not been attended to, and when the use of the carboniferous foods has been persevered in, and to some extent, though an imperfect one, they have been assimilated (and especially when beer or stout has been added to the diet), the persons become fatter and fuller and redder in the face. We then find present the variety of the disease which we may call *triphthæmia rubra (T. erythrea).* This is often apparent in middle-aged men, fat and puffy, and breathing rapidly on slight exertion, and subject to attacks of rheumatism, or what they prefer to call gout ; or liable to be laid up with attacks of influenza accompanied by more or less broncho-pneumonia. Women in this condition can often be recognised (besides that their appearance betrays them) by being compelled to hold a screen between their faces and the fire ; and sometimes they are subject to attacks of erysipelas of the face.

Erysipelas Faciei also an effect of Triphthæmia Carbonifera.

This ailment in fact sometimes attacks young women, and I have seen one or two most interesting cases of it, particularly one in a young woman who had suffered for seven years from recurring attacks of it, till her face was swollen almost beyond recognition. For nine months before I saw her she had been quite unable to follow her occupation of a weaver. I had all the evidence that one can have in such circumstances that the ailment was due to an excess of bread eating, because, first, the attacks ceased when bread was diminished to once a day. Second, the attacks recurred when the girl found herself so much better that she thought she could do as she liked. And third, the attacks again ceased when the bread was cut down to once a day. She has done her work now for nearly two years, and thoroughly recognises on what her ailment depended. But many middle-aged women who have *triphthæmia rubra* suffer from recurring attacks of erysipelas of the face (which they cleverly treat by applying evaporating lotions of whiskey and water, or eau de cologne and water, to the face on linen), and I have no doubt at all that the main predisposing cause is an excess of carboniferous foods in the diet. Sometimes the *triphthæmia chlorotica* of youth passes into the *triphthæmia rubra* of middle age, and this again (as I shall hope to show later) into the yellow or green "cachexia," as it is called, which is so characteristic of the presence or of the suspicion of the presence of malignant disease, and of pernicious anæmia. But I think I have seen cases where the *triphthæmia chlorotica* and *T. pallida* of youth becomes the cachexia of middle life, with all its disease and early death, without the intercurrence of *triphthæmia rubra* at all. (Another of the conditions which is very often associated with and is no doubt the outcome of *triphthæmia rubra* in middle-aged persons of both sexes is eczæma; and still another is thickening of the vein-coats leading to varicosity, but I do not wish to enter on the consideration of these conditions now.)

Eczæma and Varicose Veins.

As to *Triphthæmia chlorotica*, or what is commonly called *anæmia*, so far as its general symptoms are concerned, the breast-pain (*periostitis sterni*), the palpitation, the distress in breathing and in going uphill, the tenderness of the ribs and the concomitant tenderness of the intercostal and other muscles *(periostitis costarum et perimysitis musculorum intercostalium)*, so far as these symytoms are concerned, I have no doubt that the affection is a rheumatic one. The most convincing proof that can be offered for the correctness of this view is that inflammation of the heart and pericardium is so often associated with it. Many a woman who has been told she has anæmia in early life, finds in later life that she has heart disease; but this is often only a further and more developed stage of what may have been called a functional or hæmic murmur at the more tender age. Another proof of the rheumatic character of anæmia is the fact that sufferers from it often have rheumatic fever at some other period of their lives, either before the anæmia or after it; while after middle life, very many of the early sufferers from anæmia come to suffer from rheumatic affections of the joints. Then as to influenza, with its broncho-pneumonia, many persons, male and female, who suffer from it also take rheumatic fever, either before they have influenza, or subsequently; so that it seems to me that there is an alliance in kind or nature between these affections. I recently signed a death certificate in the case of a man aged 36 years, who some years before had rheumatic fever, who eighteen months before his death had influenza, which was followed by severe endo-carditis and peri-carditis eventuating in hypertrophy and dilatation of the heart. In course of time these were accompanied by passive effusions into both pleurae, œdema of the lungs, and finally by a passive effusion of the cerebral meninges, while his aspect at the commencement of the series of maladies, which terminated his life, unmistakably pointed to the same *anæmia* or *triphthæmia chlorotica* as is so commonly found in young women.

The occurrence of passive effusion, especially sanguineous effusion, into a natural hollow cavity is one of the most striking marks of most profound illness.

This case, and others I have seen, lead me to observe that one of the most striking marks of profound illness, if, indeed, it is not *the* most striking, is the occurrence of passive effusion into natural cavities, such as the pleural, or peritoneal, or pericardial, or meningeal cavities. Such effusions are often found in the last stages of cancer, as I have said already; and cases like the one just detailed show how very serious their occurrence is. The gravity of the case is usually great even if the effusion remains straw-coloured, serous, and more or less watery; but when it is pink or red and sanguineous, and still more, perhaps, if it is brown or chocolate-coloured, its import is even of graver significance. Of course, I do not include under this statement effusions such as are found in acute pleurisy (though even then they are important, and when occurring, *e.g.*, within the cerebral membranes, generally portend a fatal issue). It is the passive effusions occurring in chronic or recurrent disease that I refer to. Nor is it difficult to understand how their gravity should be so great. As in the young man referred to, the blood in these cases has become loaded with waste materials from the digestion and from the absence of methodised exercises. It has, in the first instance, relieved itself of this waste on to the muscle-nerve,- and bone-coverings. The process still continuing, an attack of rheumatic fever has occurred, leading to deposition along the ribs and heart, and very likely the pericardium (no perceptible damage, however, being discoverable in the heart after the illness had cleared away). But the process being still continued, and the blood still receiving waste unassimilated stuff from the digestion, is obliged (so to say) to get rid of it somewhere. The muscle-nerve,- and bone-coverings being full, important organs are called on to relieve the blood, and an attack of influenza follows, which intercurrently sets up inflammation of the heart, whose consequences (this time) are never cleared away or absorbed. The system being now damaged, and unfortunately the causes of the illness still continuing, the series of changes I have described occur, and the patient succumbs with passive effusion into the pleural cavities or between the brain-membranes. When I saw the man it was too late to save him; but I cannot help thinking that had the efforts made in this direction been begun sooner, say twelve months before they were commenced, and had the diet and regimen been then altered, the result might have been different.

A similar relationship seems to manifest itself when the treatment of these affections is considered. Bronchitis, as has been seen, is well and easily treated by diminishing the carboniferous foods; and a good adjunct is washing out the waste matter from the blood by alkalies taken in hot water before food. Rheumatism, on the other hand, is safely tractable in this way, but requires, further, the use of methodised movements to cope with it successfully; while the treatment of *triphthæmia chlorotica* is greatly aided by the same method of cure. It seems to me, indeed, that the administration of iron is of little or no use in many cases of anæmia until these means of management have been first used. At least I have seen many cases of anæmia in which iron has been long administered with little or no benefit, but which yielded to alkalies in hot water before food, accompanied by a diminution of the carboniferous foods, and by the prescription of methodised muscular movements under pressure. The same treatment is very valuable for rheumatism, especially for mild and long-continued rheumatism ; in fact, it seems to me that without the prescription of methodised movements under pressure, the treatment of rheumatism is, comparatively speaking, valueless and fruitless. This, again, is quite in keeping with what was before said of the relationship between bronchitis and rheumatism, the latter being a further stage of *triphthæmia carbonifera*, a less direct or more indirect effect of the over-ingestion of carboniferous foods, while the former is the direct effect. More effort and more prolonged treatment is therefore required for the alleviation and cure of rheumatism than is required for the successful management of bronchitis, but the principles of management, and the treatment of both sets of affections are essentially the same.

Whether, therefore, we look at the diseases, their causes, or their treatment, it seems to me the alliance between bronchitis, influenza, and rheumatism becomes more and more apparent, and the conclusion that they are all in reality different phases of *triphthæmia carbonifera* becomes more and more firmly fixed in one's mind.

Up to the present point we seem to have seen evidence for the belief that a main part of the predisposing causes of bronchitis, broncho-pneumonia, and pneumonia is the use in the diet of a larger quantity of carboniferous foods than is assimilated. Another form in which this proposition may be

Persons who eat properly do not "take cold."

stated is that the person who eats properly cannot "take cold"; and in this form the statement seems a very revolutionary one. It would not indeed be correct to say that no amount of such exciting causes as cold, or heat, or wind, or calm, or rain, or drought, affect him or her who eats properly. But it would be quite correct to say that these things affect him much less than if he is improperly fed; and we might even go so far as to say that unless they act with very great power indeed—that is, that unless one is exposed to them for a very long time, and in very great intensity, the influence of these causes will be very slight indeed. We have also seen reason to think that, if properly fed and properly exercised, persons would not suffer from rheumatism. And lastly, we have even seen some evidence for the opinion that influenza, although an affection probably most suitably classed among the continued fevers, is also influenced by the same predisposing causes, and that we may venture to believe that it also will have no influence, or very little influence, on him who manages himself properly as regards diet and exercises. This view, however, seems to accord but little with current medical opinion. How little in keeping with it it is will be apparent if we reflect that in the last annual report of the medical sickness and accident society, it is stated, without comment, and apparently quite as a matter of course, that claims were paid during the year on forty-five cases of influenza

Bronchitis, Rheumatism, Anæmia, Influenza, all preventible.

occurring among medical men. If influenza is a preventible disease, the medical profession do not yet appear to have been able to utilise the fact so far as to have obtained immunity for themselves any more than for their patients. Many would probably say that their views of the nature of influenza were much modified by the demonstration—supposing it to be quite complete—that the disease is due to the growth of a micro-organism. Quite recently, at the meeting of the British Medical Association at Carlisle, a suggestion was made that perhaps rheumatic fever also should be classified in the group of the continued fevers or zymotic diseases. But even if it should come to be generally believed that both influenza and rheumatic fever ought to be classified among the zymotic diseases, and that their course is characterised or accompanied by the growth of particular micro-organisms in the blood and tissues, this view might still be compatible with the opinion that both might be prevented by the use of proper diet and exercises. At least I see no incompatibility between the two views. For it might be argued, and with much force, that by the slow accumulation in the blood of waste products, due to the mal-assimilation of improper food, and to the absence of oxidation which might have been effected by proper exercises, to the slow occurrence of triphthæmia, in short, the condition of the blood and tissues might be so altered as that they would form a suitable nidus or soil for the development of the micro-organisms in

Even if diseases are associated with the growth in the blood of organisms, the predisposition to them may still be caused by improper food and absence of methodised exercises.

question. The micro-organisms, which are the recognised causes of certain diseases, we must not forget, existed before our discovery of them. Certain circumstances are no doubt favourable to their growth and development in the human organism. Certain other conditions of the organism are, on the other hand, no doubt unfavourable for the development in it of micro-organisms. It is surely making no great demand on credibility to suggest that the healthy state of the body induced by a supply of and proper amount of pure air, by proper assimilation of proper food, and by the use of exercises might bring about the conditions unfavourable to the growth of the micro-organisms; while on the other hand imperfect assimilation of improper food, and the absence of exercises, with the respiration of vitiated air might induce conditions favourable for their growth and development. The group of continued fevers or zymotic diseases is almost synonymous and almost co-extensive with the diseases due to the growth of micro-organisms in the blood and tissues. It seems always a question whether in their study of the nature and treatment of these zymotic diseases, the medical profession may not have been disposed to lay too much stress on the nature and growth of the infecting micro-organisms, and too little perhaps on the condition of the person in whose tissues they may have found a lodgment. Of the two things, the seed may perhaps have received too large a share of attention, *Relations between seed and soil—between germs of fever and state of body.*

while the soil, that is the state of the blood and tissues of the person in whom the seed grows, may have received too little. Different circumstances may no doubt determine to which of these two things most attention should be directed. In the case of a narrowly diffused and very large micro-organism (like bacillus anthracis, *e.g.*, the immediate exciting cause of wool-sorters' disease) it may be sufficient to prevent the importation of the material containing the organism; or if this cannot be done, to disinfect, and perhaps destroy, the power of the micro-organism, without troubling ourselves much as to the state of health of those persons who handle the wool which harbours it. But in the case of a widely-diffused and very small micro-organism like that causing tubercle (or influenza, *e.g.*) the conditions may be so entirely different as to render it almost hopeless to attempt to prevent contact with the micro-organism, it being necessary to devote our energies, on the other hand, mainly to rendering the body so healthy that it shall be able to throw off the attacks of the micro-organism; in other words to render the body unfit for the growth of the bacillus in it. It is unfortunate if at any time a due proportion is not maintained between these two sets of considerations. The short-lived furore made by Koch's treatment of consumption has seemed to me a case in point illustrative of the absence of this due proportion, too much attention, it seems to me, having been given to the culture and nature of the tubercle-

Why the injection treatment of Consumption fell flat.

bacillus, while too little was devoted to the condition of the patient to be treated. The bacillus was treated, rather than the person; the disease rather than the patient. There may have been some excuse for this, however short-sighted it was. The discoveries of science have been so great and brilliant in so many directions in recent years that the intellect has been dazzled by them. We have seen principles apparently quite firmly fixed in philosophy so rudely shaken that we have sometimes tended to think that there are no fixed principles at all. Koch and his co-labourers are therefore to be excused if they failed to appreciate the true bearings of his discovery, and if their intellects were blinded by its brilliancy, especially considering the manner in which the discovery was forced into public notice before the time was fully ripe. But, no doubt, time will rectify errors of this sort. New ideas and new discoveries will be harmonised with knowledge already gained, and assimilated to principles already established. Methods of treating disease formerly found useful will not necessarily cease to be so, because new ideas have arisen regarding the immediate exciting causes of disease. The *modus operandi* of the treatment will rather become better understood. The administration of large doses of iron, or painting it with nitrate of silver solution, to take an example, will still be useful in the management of erysipelas of the face, even if the disease should be proved to be due to or associated with the growth of a micro-organism in the blood or tissues. But the discovery of such a cause, supposing it to be complete, would no doubt throw light on the *modus operandi* of the remedy; while further investigations, by showing how the organism came to grow in the body, the sources from which it sprang, or from which it entered the organism, and the gradual changes in nutrition which rendered the body a suitable soil or nidus for its development, might enable us to advise the public how to prevent the disease altogether, and so to render it unnecessary to administer remedies for it at all. This desirable end, however, the culmination and goal of medical inquiry, will be reached, if at all, surely as much by proper management of the body as by attention devoted to the growth of the bacillus infecting it; as much, it seems to me, by efforts to render the body or macro-organism healthy as by efforts to deal with micro-organisms growing in it.

Prevention better than cure.

Now one of the principal ways in which the body or macro-organism can be rendered so healthy as to make it into a soil unsuitable for the growth of micro-organisms, is by supplying it abundantly with good and pure air; and this is the chief reason, no doubt, why the great and costly attention which, under the inspiration of sanitarians, has been paid to free ventilation in the past generation, has been followed by such marked results. This is why opening up narrow crooked streets, opening public parks, and abolishing so far as possible cellar-dwellings and over-crowding, have been followed by so marked a reduction of the death-rate from fever and consumption. I do not know that these diseases when they do occur are any more tractable now than they used to be. Perhaps we understand more about the management of fevers than we used to do. It may be so to some slight extent. But the main reason why fevers and consumption account for so much smaller a proportion of mortality now than formerly is not so much because we manage them better as because we have fewer cases of them to manage. Consumption is certainly still a very deadly disease to treat, although its incidence is now only half or less than half of what it was a generation ago. But so striking is the connection between the presence of overcrowding and the extent and prevalence of the fevers and consumption, that we have come to view them as on the whole dependent, and that directly, on the presence of bad air. I do not demur to this view. On the contrary, I agree with it in the main. But I should like to point out here two diseases which are classified among the fevers; one of which is almost wholly, and the other to a great extent, dependent on improper food-conditions, rather than on bad air-conditions. I refer, of course, to diarrhœa and typhoid fever. Typhoid fever is no doubt largely due to bad air, and it is impossible to overlook the evidence that has induced us to think that it has been often caused by the introduction of sewer gas

Classification of Diarrhœa and Typhoid among the fevers. Due rather to bad food than to bad air. If Typhoid generally due to bad air, it is sometimes due to bad food. Diarrhœa generally to bad or unsuitable food; perhaps sometimes to bad air.

into dwellings. But, on the other hand, besides that contaminated water may cause it, it is sometimes due to bad food, or it has been alleged to be so, on what seems to be good authority; as witness the recent report of the scientific commission appointed to determine the connection between the prevalence of typhoid fever and the consumption of oysters grown in water impregnated with sewage. That report seemed to leave no doubt that in some cases typhoid fever is due to improper feeding, or to food contaminated by sewage. This is, indeed, only what we might have expected to discover regarding the causation of a disease which expends its virulence mainly on the alimentary canal. If we had known nothing about it inductively it seems to me that we should naturally have sought for its cause in some improper food-conditions, just as on the other hand we might have expected that a disease due to bad air would have expended its force mainly on the blood or on the respiratory apparatus. As to diarrhœa, this presumption would seem to obtain even more than in the case of typhoid fever. *Its* virulence also is expended mainly on the alimentary canal, and it is most rife and abundant in autumn, when the hot, dry weather might be expected to set up decomposition in food, which might consequently irritate the intestinal tract. Of course it may be suggested that over-crowding and bad ventilation may act as causes aggravating the decomposition and fermentation in question, so that we may still view diarrhœa as a disease due to bad air. Even in this case, however, fermentation in food may be looked on as an irritant primarily of the alimentary canal, in whatever way the fermentation may have been caused. It is rather a striking commentary, it seems to me, on this suggestion, and it appears to corroborate the view that diarrhœa at least is due to improper food-conditions rather than to bad air-conditions, that its incidence and mortality have been only very slightly diminished by all the costly sanitary improvements of the last generation, while those of some other fevers have been reduced very much indeed. The mortality from diarrhœa also seems to vary from period to period, and from quinquennium to quinquennium, while that of the fevers in general has gone down somewhat steadily, coincidently with the improvements effected in sanitation. Thus, in the three years 1858—60 the mortality from diarrhœa was at the rate of 777 per million persons living. In 1861—4 it was at the rate of 874. In 1866—70 it was 1063. In 1871-5 it was 1000. In 1876—80 it was 832. In 1881—5 it was 606. In 1886—90 it was 667. The mortality from typhoid fever has shown a much more satisfactory diminution, having fallen from 390 per million per annum in 1869, to 309 in 1876, to 212 in 1881, to 184 in 1886, and to 168 in 1891. But in 1893, which was a rather bad year for zymotic diseases, it stood again at the rate of 229 per million per annum.

Diarrhœa has not diminished like the other fevers. For this reason.

As influenza has now been shown to be associated with the production of a bacillus, or as it is likely that it is so, probably it also will be classed among the zymotic diseases. But if the views detailed in these observations are correct, the predisposition to it is due to improper feeding, being produced, as a main part of its cause, by the consumption in excess of amylaceous and saccharine foods. And certainly the incidence of influenza on its last invasions has occurred after all the care that has been spoken of as having been given to sanitation and ventilation, which have, therefore, not prevented its ravages. While, therefore, the zymotic diseases in general and consumption are those diseases which are associated with the growth of micro-organisms in the body, and while these micro-organisms thrive best, as a rule, in bad and impure air, and in conditions due to over-crowding, so much so that we may say, on the whole, that the zymotic diseases and consumption depend on bad air and imperfect ventilation as a main part of their cause; *still*, there are exceptions to this rule; and the chief exceptions to the rule are, as we have seen, typhoid fever, diarrhœa, and influenza.

Although the fevers due to bad air, may not the predisposition to be affected by them be due to improper feeding? Cases pointing to this.

And, lastly, I would ask the question, still in reference to the causation of these zymotic diseases, whether, although their causation is plainly connected with bad air, since the effort to obtain good air has had so much influence in reducing their incidence and mortality—I would, I say, ask this question: May not improper feeding be a main part of the cause why the predisposition of the organism to harbour these micro-organisms is induced in the economy? Granting that micro-organisms as a rule cause the fevers, and granting that imperfect ventilation and bad air offer the conditions most suitable to the life of the organisms whose existence is so hurtful to the human economy, may not improper feeding of that economy for a long time (say for weeks or months) be a cause in turn of the predisposition on the part of the economy to be affected or infected by these hurtful micro-organisms or small existences? For my part, I have no hesitation as to the answer which should be given to this question. I feel quite certain that improper feeding is frequently a precursor in children of an attack of measles, *e.g.*, and I believe that the amount of infection to which children are exposed would frequently fail to affect them if it had not been that they had previously taken more food than they had been able to assimilate, and that for a considerable period of time. How often, for instance, does it happen that Charles or Gerald, or Mary or Gladys, falls ill of measles just after a return from the country or seaside, "where they did so well, doctor, and had such wonderful appetites." The mother has been rejoicing at the child's improved appetite, and the great benefit that the change has been doing him, and then all her hopes have been damped by the occurrence of that nasty infectious illness, which has undone all the benefit of the country or the seaside. A sensible mother will sometimes indeed ask the question—Was not the appetite too good? Did not the child do himself harm by eating so much? And would not she have done better to control his appetite and to restrict him to what she felt was sufficient for him? I believe that very often this is so, and that the excess of food taken, being imperfectly assimilated, has led to the formation of tissue of unstable equilibrium, and to the existence of blood loaded with unoxidised material, which has in turn fallen an easy prey to the fermenting influences of a fever poison like that of measles or scarlatina—poisons to which the child was probably often exposed before, and which he would easily have oxidised off again, but for the unfortunate state of his blood, brought about by that wonderful appetite which so rejoiced his parent's heart at the seaside. From these considerations we may easily see how, although the immediate exciting causes of the fevers may be exposure to bad air containing the micro-organisms which severally induce them, the predisposition to be affected may have been much aggravated by improper feeding. We come thus to a remarkable parallel between the causation of the fevers, and of inflammatory diseases like bronchitis and pneumonia. For just as we saw that the immediate exciting causes of the latter are such influences as cold, heat, fatigue, wind, storm, and so on, and

There is a parallel therefore between the predisposing causes of inflammations and of fevers.

that these causes require to be present, and acting in much greater intensity when persons are improperly than when they are properly fed, so that properly fed persons will scarcely suffer from them at all, while improperly fed persons suffer severely from very small amounts of them ; so in the case of the fevers we discover that like principles hold true, and so it comes about that we may define the fevers as diseases induced by such exciting causes as micro-organisms conveyed to the economy mainly by bad air, but requiring for their development the predisposition in the organism caused by improper feeding ; just as the inflammatory diseases are those due as their immediate exciting causes to exposure to cold, heat, wind, wet, &c., acting on an organism predisposed to be affected by improper food-nutrition. And I might have added that the predisposition to inflammatory diseases on the one hand, and to fevers or zymotic diseases and to consumption on the other, induced largely by improper food conditions, is aided greatly by the absence of methodised exercises. In order, therefore, to alter predisposition it is incumbent on us to feed the body properly and to exercise it methodically and proportionately. Predisposition to disease is often, in our thinking, associated with the state of the ancestors of the persons predisposed. No doubt the state of the ancestry is a potent factor in the production of strength or weakness in the children. In the meantime, *To alter predisposition we must feed the body properly.*

Predisposition to disease is far more dependent on the food we take than on the state of our ancestors.

Blood-poisoning mostly induced through the digestion, through the food. Somewhat through the air respired. Very seldom through accident or injury.

however, it will be well for us to associate predisposition with such factors as healthy feeding and proper exercises — factors which we have it in our power seriously to modify, rather than with the state of the ancestry of the persons in question — conditions which it is, of course, quite beyond our power to affect. The blood and tissues are made healthy on the one hand, or they may be made unhealthy on the other, by the quality of the air respired, by the food consumed, and by the exercises indulged in, far more frequently than by the insertion into them of a drop of pus or matter from a putrefying wound, if we accidentally prick ourselves in managing such. And yet, while we manifest the greatest horror if the latter accident happens to us, we are quite calm in presence of the slow poisoning that is continually going on from the respiration of impure air, the ingestion of improper food, and the absence of methodised exercises. Perhaps I ought not to say so regarding the respiration of bad air. We are alive to the dangers of that, and have taken important and costly steps to obtain good air. But we do not adequately realise the danger of blood-poisoning which overhangs us continually by the consumption of improper food, and by the retention of waste products in the blood through the absence of exercises. By far the most potent cause of blood-poisoning is undoubtedly what finds its way into the blood through the mouth. If we come to think of it, there is nothing and can be nothing in the body, no diseased products deposited in it anywhere for instance, which, or the sources of which, were not first in the blood. And there can in turn be nothing in the blood which was not first in the food we have consumed, or in the air we have breathed. There are no other sources from which the materials of disease can find their way into the body. This statement ought to be qualified indeed as regards the occurrence of real hereditary disease, as when a child is born diseased (syphilised, *e.g.*), or when a poisoned wound occurs, but these occur so rarely that for practical purposes the statement holds true. With these qualifications (not very often required, but when they *are* required, being as a rule visible and plain enough) we may, it seems to me, accept as true the following propositions:—1st, *Materies nulla morbifica in corpore invenitur quae non prius in sanguine inventa est.* And 2nd, *Nihil in sanguine quod non prius aut in cibo aut in aere.*

With slight qualification we may say:—
1. There is no disease producing material in the body which was not first in the blood.
2. There is nothing in the blood which was not first in the food or in the air.

Occurrence of Infectious Fevers might be still further reduced by attention to food and exercises.

From the discussion which has preceded, we have seen that the diminution of the fevers and of consumption, in both cases amounting to from 40 to 50 per cent., is the one improvement which has taken place in the last fifty or sixty years, and is the only justification for the statement regarding the great advance in medicine so frequently made. Our further consideration of the question leads, however, to the conclusion that, much as has been done in this direction by attention to air, much more might still be added to it by attention to food and exercises. In fact, it seems to me that by proper attention to these things we might put an end to the infectious and zymotic diseases altogether.

Be this, however, as it may, we seem to have seen evidence for the view that the affections I have mentioned, bronchitis, pneumonia, rheumatism, and influenza, have the foundation laid for their occurrence in the body, in the slow and gradual silting up of the tissues by the effects of what I have called triphthæmia carbonifera. Many other pathological conditions are probably explicable by like considerations. I have mentioned incidentally the relation between triphthæmia carbonifera and the occurrence of facial erysipelas, and have hinted at the connection of triphthæmia with varicose veins and some other affections, far enough apart in character although at first sight they may have appeared to be. Many others may also be explained in the same way. Why, for instance, do many persons suffer from headache when they walk—or even drive—in a wind? Because the involuntary and often unconscious resistance which we make to wind is effected by putting muscles on the stretch, and particularly the muscles which attach the head to the trunk. But in triphthæmia carbonifera these muscles are in a state of passive congestion; their origins and insertions are tender, and when therefore they are put on the stretch the tender points are drawn upon, and the pain so set up, speedily spreading over the occiput and the rest of the head, causes the headache of which we complain. Why again do women suffer from apoplexy more than men? In 1892, according to the Registrar-General, there died in England and Wales 9299 females of apoplexy out of 15,157,111 females living. In the same year 7829 males died out of 14,247,943 living. The female death-rate from apoplexy was at the rate of 613 per million living, while the male death-rate from the same disease was 549 per million living. Year after year similar proportions obtain. Why is this? I have no doubt it is because women affect most the sorts of food which cause triphthæmia carbonifera, and because the use which by preference they make in their food of bread, and cakes, and puddings, and sugar causes a slow congestion of the vessels, alters their structure, causes a slow accumulation of waste undigested material to be deposited in their coats, and alters their elasticity so that after a time on slight exertion they give way before the pressure of the blood current. And no doubt the absence of methodised movements and of muscular exercises in women accounts for some of the excess also. In fact it is plain that as life advances in women so fed, exercises become dangerous, and in treatment have to be recommended with the greatest care, since even slight exertion may cause rupture in vessels which have become so inelastic from mal-nutrition. Men, on the other hand, still prefer a different sort of diet and use

Why women die of Apoplexy more than men.

exercises to a greater extent than women; and although they have more exertion than women, their vascular nutrition is better, and so the vessels bear strain better than do those of women. The habits of men and women, in towns especially, are fast approximating to one another, and the differences in the incidence of disease, which still obtain, will probably tend to become less marked, unless some changes can be induced in the habits of the people. A fact like the greater incidence of apoplexy among women than among men seems exceedingly difficult of explanation at first sight. For my own part, I confess that I thought that the opposite condition obtained, and that men suffered from apoplexy more than women. I thought that as they did so (as I wrongly supposed) this was a staggering blow to my theory of the causation of the disease; and it was only after an examination of the facts as stated by the Registrar-General that I was reassured. But the reassurance, and the ability to reply to what had seemed a crushing objection to the theory, has confirmed me in a belief of its truth. It may, perhaps, be objected that according to the theory, women ought to suffer from bronchitis more than men, since women live more largely on the foods which induce it. In point of fact, they do not so suffer. In 1892 there died 56,024 males out of 14,247,943 from asthma, bronchitis, and pneumonia, or at the rate of 3932 per million males living. Out of 15,157,111 females on the other hand, there died only 50,657 persons from these causes, or at the rate of 3342 per million living. But that a smaller proportion of females than that of males died from these diseases is, I think, explained by the fact that females are less subjected than are males to exposure to weather, and that although improper feeding is the main or chief predisposing cause of bronchitis, still it is not the only one by any means, the exciting causes being exposure to cold and hardship, &c.

Pruritus and Caruncle due to Triphthæmia Carbonifera. Diseases of sex mostly due to habit.

Another of the pathological states due to improper feeding, and explained by the theory, while inexplicable without it, is the greater incidence of pruritus ani in women than in men. It undoubtedly depends on their food and not on their sex. Just as many so-called family diseases are due to family habits, so, many diseases of the sex organs are due to the different habits of the two sexes. No doubt pruritus ani in women is often associated with pruritus vulvæ, but this is an anatomical accident: the property or essence of the disease is its existence: its accident is that it appears in a particular place. Volumes have been written on the miseries of the affection, and numberless applications recommended for its relief. Alteration of the diet, with the administration of an alkali in hot water before food, may be guaranteed to relieve it in three or four days, and to cure it in six or eight weeks. I promise this with the greatest confidence in all cases in young and middle-aged women, and am never disappointed when patients do as they are told; and this is one of the affections in which patients do, as a rule, do as they are told, because the annoyance they suffer is so great that they will generally do anything whatever to obtain relief. The same treatment is equally efficacious in the management of urethral caruncle, but may require a much longer time to effect a cure. If time and space permitted, many other diseases could be referred to, "angina pectoris," for instance, as it is called; and many others. I may add here what I am firmly convinced of, viz., that the diseases of women in general, the little ailments they have, the frequent complaints they make, amounting often not to illness but to malaise, or being "out of sorts," are due, not to their sex but to their habits, and in particular to their habit of eating too often. They feel "faint," from indigestion really, but they think it is from want of food. No doubt taking food relieves them at the time, and when the feeling comes back they again relieve it by taking more food, and so the vicious circle or round is continued—the faintness due to indigestion is first relieved and then aggravated by food—the food causing the faintness and the faintness causing the desire for food—until serious disease is set up, rheumatism or anæmia, or perhaps ulcer of the stomach. It is not that women are gluttonous—a very few of them are no doubt—it is not so much that they eat too much as that they eat too often, that they suffer from those trifling but frequently recurring ailments that are so characteristic of the sex. And in accordance with these considerations, it is astonishing how much benefit can be given to those women who are sensible enough to take the advice to eat three times rather than four times a day; yes, and in many cases to eat twice rather than three times.

Pruritus ani (Eczæma) depends on an excess of starch in the diet.

A case of pruritus ani et vulvae, which strikingly proves on what the causation of this most troublesome affection depends, may be mentioned here. A stout, fat woman æt. 41, who had suffered from this complaint for a long time, presented herself as an out-patient at the Bradford Infirmary in August, 1896. She had suffered from time to time for no less than seventeen years from the intolerable itching which characterises this affection, and had sought advice and assistance from several quarters, though without obtaining relief, among the rest from a hospital at Sheffield eleven years before I saw her, and from other quarters. She used to suffer from diarrhœa (due no doubt to fermentation of carboniferous foods), but this had subsided of itself before she came under my care. She had been subject to attacks of "influenza colds" from time to time, that is, had attacks of sneezing with cough, but had never been laid up with bronchitis proper. When I saw her she had very disturbed nights on account of the itching, which made her scratch herself in her sleep sometimes till blood was drawn. By the simple advice of recommending her to take bread only once a day, and greatly diminishing other forms of carboniferous foods, I was able entirely to relieve this long-standing ailment, so that in about five weeks from the time of her coming under treatment she was able to sleep right through the night. In another fortnight, all the eczæmatous spots (I suppose that *pruritus ani* really is *eczæma?*) had healed.

There now occurred a rather remarkable incident. For some time I lost sight of the patient, she having absented herself from the out-patient room from the end of December, 1896, till February, 1897, when she was nearly as bad as ever again. What was the reason of this relapse? She told me that she had had a miscarriage, and had been obliged to consult a medical man. He had put her on the conventional treatment usually adopted in that condition, ordering her to live on gruel, bread and milk, rice and milk, &c. The increase of starch taken brought back the itching, and she was obliged to make her way back to the Infirmary as soon as possible to obtain relief again, in which she was not disappointed. This is, therefore, a case in which a medical man—first, alleges that the main cause of an ailment lasting for seventeen years is wrong eating (and particularly that it is eating too much bread); second, in which he, therefore, recommends that bread be taken only once a day. Thirdly, the patient recovers, or *practically* recovers (she was not *perfectly* well) on taking his advice. Fourthly, she is compelled to put herself under advice for another ailment; and for the management of that ailment is recommended to live on the kind of food which was alleged to be the main predisposing cause of her first ailment. Fifthly, the first ailment returns in accordance with the original statement. Sixthly, the ailment again disappears when she again follows the original advice. I do not know what more clinical evidence could be demanded by the most sceptical in the way of a demonstration as to what the causes of the ailment were. The logical methods of agreement and of difference combine to demonstrate that the main predisposing cause of *pruritus ani (eczæma)* is wrong eating, and in particular that it is the consumption in excess of starchy food. And that conclusion applies not to this case alone, but to practically all cases where the experiment is made. The conclusion that the alleged cause is really the main cause has become firmly fixed in my mind, and has indeed the force of a law of nature or of human organisation. And, of course, any one can for himself put the law into action where appropriate circumstances arise.

Is Pruritus ani caused by some spore taken into the blood through the digestion? Might it not be possible to demonstrate the existence of this spore in the food? in the chyle? in the blood? in the tissues?

There is, however, a further line of evidence possible, in order to prove this conclusion up to the hilt. If, as I suggest, starch (and sugar) is the cause of *pruritus ani*, how does starch (and sugar) cause it? Probably by carrying down into the stomach and thence into the intestines, and thence again into the blood, some spore or seed which grows by preference at the orifice of the bowel. Might it not be possible to demonstrate the existence of this spore first in the starch granule of the food, and second in the blood? (Thirdly, possibly in the elaborated chyle)? Perhaps this is the way in which the penicilium finds its way into the urine? Perhaps saccharo-myces is the cause of *pruritus* and *eczœma?* If not, perhaps some other spore is?

Let me suggest this line of investigation to some of our clever young microscopists and culture-experts who have more leisure on their hands than older practitioners. It would probably prove most useful to medicine, and most profitable to themselves. They might, perhaps, incidentally be able to show the connection between the occurrence of *herpes labialis* and the existence of such a spore? And might possibly be able to show that *herpes labialis* and *pruritus ani* are the same disease in different situations? and due to the same or similar causes? And perhaps other surprising conclusions might follow? The investigation does not seem to me particularly difficult to any one possessed of the necessary dexterity, knowledge, instruments, and leisure. If it should prove that this is a true suggestion, one can easily see how the outward application of antiseptics and germicides might relieve indeed by destroying the local growth, but could do no real good, until the supply was cut off by altering the diet. As well might one marvel at his failure to eradicate noxious weeds from his garden, who contented himself by rooting up the growing plants, while taking no pains to prevent the entrance of seeds from outside.

Now I can imagine that some (if there are any such) who may have followed the argument in these remarks so far, and who may perhaps have been disposed to yield a certain measure of assent to it, and to the views I have so far expressed, will pull themselves up and refuse to go further. It is my opinion, that cancer also is a disease mainly caused by an excess of carboniferous foods in the diet. In greater detail, I believe that cancer is a disease, the predisposing causes of which are mainly improper feeding, and that the form which that improper feeding takes is generally the consumption of larger quantities of bread, potatoes, oatmeal, rice, sago, tapioca, sugar, and Yorkshire pudding (one or more of these foods) than are assimilated. I have made a point of inquiring into the habits of a large number of persons who have come under my observation suffering from cancer. By cancer I mean, as was said before, carcinoma or epithelioma. I am not able to include sarcoma, but on the other hand am not able, for want of experience, to exclude it from my statement of opinion as to causation. The general result of my inquiries regarding carcinoma or epithelioma, which is, of course, far the commonest form of cancer, is that the persons suffering from it have lived largely on the foods named. A very common statement has been

Cancer is also a result of Triphthæmia Carbonifera.

"I have never liked meat." I know that recently a surgeon has written to say that the consumption of meat is, in his opinion, the cause, or a main part of the cause, of the increase of cancer. That does not coincide with my experience. I do not say that the over ingestion of meat as a food *might* not cause cancer. I think, on the other hand, that the long continued consumption in excess of any sort of food might possibly eventuate in producing the disease, when in course of time the tissues had become loaded with waste matters such as ptomaines, the poisons generated by various bacilli, and, generally, with unassimilated material introduced into the blood through mal-assimilation of food. But so far as my experience goes, the cases of cancer I have seen have not been caused by an excess consumption of meat, but have, on the other hand, been brought on by an excess consumption of saccharine and starchy foods, or at least have occurred in persons who were fond of these foods and not of meat. For instance, I saw in the Bradford Infirmary a woman, aged 42 years, "suffering from a large infiltrating malignant growth from lips of cervix-uteri" (House-surgeon's note). I had never seen the woman before. There was no doubt as to the diagnosis; but I said to the resident medical officer, "You will find, if you inquire, that that woman has lived largely on carboniferous foods." It is well known of course in hospitals that young men know, as in most departments of life, much more than their seniors. And the mistakes of older men, when they commit them, are treated far more hardly than those of younger ones, which are generally quietly passed over. This is perhaps right enough and to be expected. One ought therefore to feel very sure of the soundness of his deduction before venturing to give himself away in that manner regarding a patient whom he had never seen before, and on the mere strength of a theoretical and practical conclusion regarding the causes of the ailment from which she suffered. Had I been wrong, no doubt I should have heard more about it. However, my young friend inquired, and ingenuously wrote the following note, which I read on my next visit:—"Patient is fond of bread; never takes potatoes; eats rice; never liked meat; bad teeth." I saw with Dr. H. a man æt. 56, suffering from cancer of rectum. His diet had been bread and butter and tea for breakfast, sometimes oatmeal porridge. Dinner: meat, potatoes, bread, and rice, sago, or tapioca puddings, often Yorkshire pudding. Tea: bread and butter and tea. Supper: oatmeal porridge. The whole diet here is starchy, except the small piece of meat (viz.: 2 or 3 oz.) at dinner. That starchy food, taken over a course of years, had fermented in his digestive tract—how often these sufferers say they have had a "poor stomach"—had poisoned his blood, loading it with waste matters, and had, I have no doubt, led to the production of the cancer. I asked the matron of our small Cancer Hospital to give at random the diet of the first three cancer cases she chose to question. Here is the result:—1. "Mrs. B., æt. 55. Breakfast, 7.30, tea, bread, bacon or egg. 11.30, cheese, bread, beer. 1.30, meat, potatoes, vegetables (green? A.R.), milk—or Yorkshire—pudding. 5.30, bread, butter, tea. 10, meat and bread. Note that this woman had five meals a day. She had bacon or egg for breakfast and meat twice daily, which is unusual. But she had bread four times a day, and if Yorkshire pudding be counted (and it is really the same thing as bread), five times. But she survived to 55, and I have no doubt might have survived to 65 if she had had the sense to keep to three meals, like, say, her breakfast, dinner, and tea, with proper intervals between them.

2. "Mrs. S., æt. 69. 8 a.m., tea, bread, bacon, or egg. No lunch. 12.30, meat, potatoes, sometimes vegetables (green? A.R.), and potted meat. 4-30, bread, butter, tea, and remains of dinner. 10 p.m., potatoes, milk, or porridge."

I have not much to say about this case. The woman survived to 69, and it may be said she had lived her day, and must be expected to die of something. I incline to think that had she had one meal after dinner in place of two she would have been healthier, and would probably have lived longer. But I give the case as I got it.

3. Miss F., æt. 44. 8 a.m., tea, bread, and butter. No lunch. 12.30, potted meat and bread

taken at the mill. 4, bread and the remains of dinner. 7, tea, bread, and butter. 9.30, bread and beer. Bread here was taken five times a day, and once with beer. As bread takes five hours to digest, often longer, let any one imagine the state of fermentation that that poor woman's digestive tract must have been in day after day for say twenty years, with "tea" following dinner in three and a-half hours, another "tea" following the first in three hours more, and a third "tea" following the second in two and a-half hours. The only meal which was allowed any approach to a reasonable time for its digestion was breakfast; and dinner followed that in four and a-half hours, while five and a-half hours would have been much better. No wonder the poor thing did not survive beyond 44 or 45 years.

These are cases of women in the humbler walks of life. But their well-to-do sisters are doing the same thing in a different way. One of them told me recently that she had tea and cake, or tea and bread and butter, at no less than three different houses in one afternoon, and all within two hours or even an hour-and-half of one another. Well for her if the attack of indigestion which ensued on that series of indiscretions shall teach her more sense, and help her to prevent the irreparable damage which in one form or other, probably enough the onset of cancer, is certain to ensue if she persists in so insane a course. And yet how many women are living like this! Here is another case: Mrs. L., æt. 50. Breakfast, 8 a.m., bread and butter, tea. Dinner, 12, meat, potatoes, Yorkshire pudding, rice pudding, bread. 4.30 p.m., bread, butter, tea. 8, bread, butter, stout, or quaker oats, or oatmeal porridge. This perpetual fermentation of food resulted in the production of a malignant ulceration of the mouth of the uterus.

Sex only an apparent cause of disease. Habit the real cause.

It seems to me from these cases, which could be multiplied indefinitely, that an excess of fermenting foods is a main part of the predisposing causes of cancer, the over ingestion and too frequent eating of starchy foods. And the reason why men are fast approximating to women in falling under the same terrible scourge is this, that they are, owing to the circumstances of their lives, approximating more and more to the habits of the women in the times and materials of their food. It is not a question of sex at all. It is a question of habit. I should like to detail this next case. Mrs. J., æt. 44, a "neurotic" woman, full of ailments, with pains everywhere; "hysterical" she was called by young doctors who knew no better; and no doubt as soon as one ailment was prescribed for, twenty new ones had arisen. But that "neurotic" woman is now suffering from cancer of the cervix uteri; and here is an account of her diet. She has always had a "poor stomach" (and no wonder) and can hardly take any breakfast. Would take just a cup of tea about 8. Then about 10 some bread and cheese with bitter beer or milk. Dinner at 1 (when the bread and cheese and bitter beer were still churning in her poor stomach), "not particular as to her dinner," but would get potatoes or bread and butter and tea. Never was much of a meat eater, and never touches it now. At 3 or 3.30 (two hours or two and a-half hours after dinner) tea and bread and butter. About 7, supper of biscuit and cheese or glass of beer or porter. Always had a good home.

The Cachexia of Cancer.

Surely I have made good my suspicion regarding the connection between cancer and carboniferous foods? I think I have. In a former part of these observations I showed how cancer often follows on rheumatism. I also showed reason to suspect that rheumatism is due to an excess consumption of carboniferous foods; and I showed the connection between rheumatism and bronchitis and broncho-pneumonia. I also showed the dependence of bronchitis and broncho-pneumonia (and influenza) on the consumption of carboniferous foods and the absence of proper exercise. Also it will be apparent to whoever really thinks about it and takes account of what he sees, on what the so-called "cachexia" of carcinoma depends. He will be able to trace its commencement in the pasty pallor of dyspepsia, its continuance in the greeny-yellow colour of anæmia, in the earthy or ashy appearance of rheumatism, and its termination in the yellow or orange colour of patients suffering from the profound mal-nutrition of pernicious anæmia and of carcinoma. The blood gets loaded more and more with waste materials at different stages of our life-history; and in meeting our friends, or even in passing strangers in the street, a comparatively small observation of their appearance will enable us not only to tell their age, but to say on what foods they mainly live.

Disease is one, with many different phases or manifestations.

There is high authority in medicine for the belief that disease is one. This view, which the father of Greek medicine seemed to reach by a sort of intuition, has also been forced on us by the considerations advanced in these observations. There seems to be strong probable evidence for the belief that *herpes labialis*, *tonsillitis*, *tracheitis*, *bronchitis*, *rheumatism*, *pruritus ani*, *caruncle*, *diabetes*, *apoplexy*, *erysipelas faciei* (Bright's disease?), and *carcinoma*, are all different phases or manifestations of the triphthæmia carbonifera, of which I have spoken. I have not said anything regarding the predisposing causes of Bright's disease, and I do not now go into the differential diagnosis of the various forms of it. (For practical purposes, as distinguished from theory, however, is there much advantage in separating the various forms of fatty, gouty, and granular kidney from one another? Are they not all to be treated alike?)

Suggested mode of causation of Bright's Disease.

But as to the predisposing causes of Bright's disease, and as showing their connection with those of the affections already named, it seems to me that the following considerations are instructive.

The processes which bring on perimysitis, perineuritis, periostitis. and arthritis have been dealt with at some length ; and it was shown, or suggested at least, that the blood, loaded with waste materials from imperfect assimilation of food, rids itself of these waste materials on to the muscle-sheaths, nerve-sheaths, and bone-coverings when laid out on these extended surfaces to nourish their tissues. Suppose, now, that the process by which the blood is loaded with waste materials still goes on. Suppose (not an unlikely supposition, in fact, a highly probable one) that the blood carried to the kidneys for their nourishment by the renal arteries is also, like that carried to the muscles, loaded with waste and imperfectly assimilated materials. It will obviously be liable to lay down in the various portions of the kidney-structure some of the foreign materials of which, so to say, it wishes to rid itself, or which it is physically inconvenient to convey, and which, therefore, get filtered out in the process of nutrition. In this way tubuli may easily become blocked, congestions and inflammations may occur, interference with proper excretion may take place, and disease be induced. I have, in fact, no doubt that these are the ways, or some of the ways, in which disease does insidiously begin in the kidneys, and that many cases of Bright's disease are so induced. There is a very general opinion that Bright's disease, with inflammation of the kidneys, bladder, &c., is more due to the consumption of such nitrogenous food as meat than to an excess of carboniferous material like bread and rice puddings. This view may be correct. Renal diseases are no peculiarity of men, but they are undoubtedly more prevalent among men than among women, and men eat as a rule more meat than women. Worry is also an alleged cause. I suppose men suffer from worry more than women? although both sexes have their share of that tribulation which seems to be the invariable inheritance of the human race. No doubt alcohol is also a cause, but I am not in these observations considering the effects of alcohol. On the other hand, I can recall to memory several cases of Bright's disease, into the causation of which neither alcohol nor an excess of meat-eating entered as a predisposing cause. The history in none of these cases justified the belief that this was so. In one instance a middle-aged man, who never took meat more than once a day, lost his life from Bright's disease under my care. If food was a predisposing cause, or the chief predisposing cause in that case, it was rather bread eaten too often than meat, for the man not infrequently made his dinner of tea and bread and butter. It could not be alcohol, because, although not a teetotaler, he was one of the most temperate of men. I think, as I write, of other cases into which neither alcohol nor meat entered as a predisposing cause, at least so far as could be made out; but in all of these the food habits of the patients indicated a fondness for bread, potatoes, puddings, oatmeal porridge and the cereals. Into the causation of other cases, no doubt both alcohol and meat entered as predisposing causes. On the whole, however, while recalling many cases to which the rule would not apply, I am indisposed to oppose the prevailing medical opinion which suggests that an excess consumption of nitrogenous foods is a predisposing cause of Bright's disease. But if this is so, it still is induced by improper feeding; and in view of this consideration we must still add it to the long list of diseases which appear to be due, as their main predisposing cause, to improper feeding and the malassimilation of food. And this reasoning leads us to agree with Hippocrates in his remarkable anticipation of the discovery that disease is one. But we are not content to rest in this theoretic conclusion, for we are at once compelled to translate it into a practical inference, which seems irresistibly to follow, viz., this: *The same course of treatment which enables us to get rid of small and slight ailments like the occurrence of herpetic and serous eruptions about the lips and small ulcers inside the mouth and on the tongue; the same treatment which cures sore throats and inflammations of the wind-pipe and of the bronchial tubes; the same course of treatment which helps us to get rid of rheumatism and eczæma and which cures erysipelas of the face; the same course of management which cures these diseases will prevent or postpone the onset of influenza, of apoplexy, of Bright's disease, of diabetes, and of carcinoma.* Now, one ought

Bright's Disease may be due, as its chief predisposing cause, to meat-eating.

The same management which cures Bronchitis, Rheumatism, and Erysipelas of the Face will prevent Influenza, Apoplexy, Bright's Disease, Diabetes, and Carcinoma, under 65 or 70 years of age at least.

to speak modestly in face of an inference of this kind, with its far-reaching and even tremendous consequences; but I am compelled to state here my entire submission to the irresistible force of its logic, and to add that more than once now have I seen abundant reason to feel satisfied with the beneficence of its practical effects. Of course the human organism must wear out, and we must die of something; but I, at least, am satisfied that death from diabetes, Bright's disease, influenza and pneumonia, apoplexy, and carcinoma ought not to happen, and will not happen, under 65 to 70 years of age, at least, in those who attend to the predisposing causes of these diseases so often mentioned, improper relations between the body and food, and improper relations of the body to methodised exercises. As we saw formerly, about one-third of all the deaths that occur happen between the ages of 25 and 65 years. As has been said, there were in 1893 in England and Wales 355,125 deaths of persons over 5 years of age. Between the ages of 25 and 65 years 227,330 of these deaths occurred. Now, supposing that we admit that a proportion of these were unavoidable. Among large numbers of people, variously conditioned, no doubt some deaths must happen. The only question is as to what is a fair and reasonable allowance for these necessary deaths. Including the small number of persons who die from accidents, I have thought that 20 per cent., or one fifth of the 227,330, would be a reasonable allowance to make for unavoidable deaths. Some might make the allowance more; some less. If we consider a resonable deduction to be a fifth, there still remain 181,864 deaths which occurred in the year 1893 in England and Wales which ought not to have occurred till later. This is a very large number, and it is more than half of all the deaths that occurred in that year over 5 years of age. To think that 180,000 deaths are occurring in England every year which ought not to occur, to think that that number of people, or something like that number of people, are dying in our country in the prime of life, when life is most valuable (because for the most part persons at those ages are surrounded by children dependent on them), and to think that these deaths are, in a very practical sense of the term, preventible deaths, seems to me an appalling reflection. What the prevention or the possibility of the prevention of these deaths means is almost unrealisable.

One reflection, however, may be indulged in. The sanitary and general gains obtained in the country are in the diminution of fevers and of consumption; and by means of these gains, something like four years have been added to the average duration of the life-time of the people. But these gains have been made, on the whole, in the early ages of life, as I showed in a previous part of these observations, when I pointed out also that the expectation of life was no better, or hardly

Gain to life at early ages not equal to gain at mature ages.

any better, now at the middle periods of life than it was fifty or sixty years ago. The gain is of course great, but not so great as if the addition had been made to the expectation of life at the middle periods, nothing like so great in fact, because life under 25 years of age, though useful and valuable, is so, after all, more in promise than fulfilment. It is, at any rate, nothing like so useful and valuable as at the middle periods of life, when important obligations have been undertaken to society, which it is of the utmost consequence should be fulfilled. Now, if what I am urging is true, if the diseases to which I have so often referred can be cured, and can be prevented by alterations in our habits as to food and exercises, how great would be the benefits so obtained. They would be the very benefits we are in search of, for these are diseases of the middle periods of life and of the later periods rather than of the earlier. And the gains to the life of the community would be benefits rather to the parents than to the children, as has for the most part happened in the gains made by reducing the fevers and consumption. This would of course be the case if carcinoma could be prevented. Of course I do not say that if women were to live on meat or on any other sort of food as much as they do on bread, or if they were to use it as often, that they would not perhaps suffer from cancer as they are doing now. I think it might be some other disease to which they would succumb. Of course I do not know; but I am quite certain that the cases of cancer I have seen, far too many, I am sorry to say, are not due to an excess of meat eating, but are due to an excess of starchy and saccharine foods.

The answer to the conundrum of the Sphinx.

We can now listen with less perturbation of spirit, and we are no longer in despair when we hear the conundrum propounded by the sphinx of cancer: "What are the causes of that fatality which does not affect children, which takes time to act, which affects women more than men, but which begins to affect men more than it used to do, and which is different from what obtained twenty-five years ago?" It is mal-assimilation or bad digestion leading to bad sanguification, leading to mal-nutrition of tissues; and the bad digestion is due to too frequent feeding, and to too frequent eating, as a rule, of starchy and saccharine foods. The veil has been lifted, the mystery has been cleared up; and is no longer impenetrable; and from behind the place where it was, rings out hopeful and clear to all those who listen: Rejoice, all ye who suffer, for your pains will soon be over, but your children need not suffer as you do. Your disease is incurable, indeed, but it was and is preventible; and the means of its prevention are the simple ones known to all and within the power of all, the proper use of air and of food and of methodised movements.

I shall be told, no doubt, that even admitting that many persons suffering from cancer have been shown to take a large quantity of carboniferous food, or rather, perhaps, have been shown to take it often or too frequently, still it does not follow that wrong eating was the main predisposing cause of the cancer. The disease may have been due to something else; and of course, as I have said, other medical men attribute cancer to meat-eating. I can only say about this last opinion that it is certainly not borne out by the inquiries I have been able to make into the habits of persons suffering from cancer, as I have just showed. Cancer truly, although it probably affects the poor more than the rich, is not at all confined to the poor, whose means may not allow them to buy meat. It devastates also the homes of the rich who can have as much meat as they wish. I should like to observe, in passing, that there are other foods besides the starchy and saccharine stuffs on the one hand, and meat on the other, large and numerous varieties of foods too much neglected, as I hope to say soon. But it seems to me that even among the rich who can get anything they wish, or require, those among them who have suffered from cancer have been, as a rule, given to the habit of too frequent eating, mainly of bread, and sugar, and cake, and pudding-stuffs.

No proof that Cancer is hereditary.

Another line of argument with which one is continually being met is that of heredity. The grandmother had cancer, it is said; no wonder therefore if the mother had it; and the daughter's chances of taking it are therefore all the greater. But is this sequence common? I do not find it so. It much oftener happens, it seems to me, that the grandmother died of bronchitis, say, or of pneumonia, or of "old age," or of a "complication of diseases," while the mother died of influenza, perhaps, or of apoplexy, or Bright's disease, or from some other cause. But even when this is so, and when no history of cancer can be made out in the family, there is a kind of medical pessimism which is still dissatisfied, and is apt to darkly hint that although no cases are known, still some may have occurred in the family and may have been forgotten. But even if cases can be discovered, the question still remains, how did those persons who suffered from it get the cancer? How did they live? They have lived, as a rule, I find on inquiry, in the ways I have described; and these predisposing causes are sufficient, in my judgment, if long enough continued, to induce cancer in any average human being. Like causes acting on like organisms in succeeding generations have induced like effects. What else could we have expected? Again, it is said—but the predisposition, has not that been transmitted? I have already answered that suggestion. Predisposition is inverse-resistance; it is weakness; and it is created no doubt sometimes by the inheritance of a weakly organisation, but mainly by the mismanagement of that weakly organisation by improper relations to air, or to food, or to methodised movements, or by improper relations to one or more of these. But surely if cancer were inherited, or if predisposition to it were inherited, it would appear early in life? But it is well-known that a very small fraction indeed of the cases appear in childhood. The fact is that we are all predisposed to everything. Any human being may have any human ailment. It depends on how we manage ourselves whether we suffer or not. It depends comparatively little on how our ancestors managed themselves. I am sure that only a small percentage of the disease we see is hereditary. Far the largest proportion is due to our own actions. There is really no end to the suggestions that are made by the theory of the heredity of disease. If you say that no cancer has been known in the family, then you are told that the Bright's disease in the mother, or the pneumonia in the father, shows family weakness and accounts for the cancer in the son or daughter. And when one suggestion has been combated, another is made. Our ancestors must have died of something; and so must we in our turn. But if they or we die at 45 or 50 or 55 years of age, when we ought to have lived to 65 or 70, or even longer, it will be well to inquire if we cannot account for the premature decease, before we bow down in despairing worship and terror before a hereditary fetish.

All human beings are predisposed to all human ailments.

I am tempted to mention here very shortly a set

Cases of Cancer in successive generations of the same family do not necessarily prove hereditary transmission.

of incidents which recently came under my observation in this connection. A lady about 30 years of age said to me: "I am afraid cancer is in our family. You see grandmother had it; and mother has it. I fear it is in the family." I happened to know that the grandmother had died at 75 of cancer of the œsophagus. I do not know anything of her habits, nor could my informant tell me, so I could say nothing as to the cancer in that case. But the old lady had been very strong and healthy, and had brought up a large family of children, of whom one, my informant's mother, was then suffering at 63 from cancer of the pylorus. The coincidence of these two facts had terrified my informant, who thought that all her mother's children would probably be swept away by cancer. But death at 75 is death at old age, and at that age it is likely that most human beings will die of something. The grandmother certainly had lived her life, and a long and healthy one. The next thing was to consider how long she had been ill. My informant could not say; but it could not of course have been more than, say, a couple of years. However, I said, "Suppose we make a most wild and extravagant supposition, and suppose that grandmother suffered for twenty years before she died, she would begin at 55 years of age in that case. But your grandmother was 35 years of age when your mother was born. Is it likely; is it possible that your grandmother transmitted to your mother that which she did not have herself for twenty years after your mother was born?" In point of fact, it was nearer forty years than twenty. What she did transmit was organisation; it was humanity. And any human organisation may suffer from any human ailment. It depends on the circumstances to which it is exposed. I knew more about the mother. I knew that for many years she had suffered from dyspepsia before the cancer set in; and I knew, but, alas, without then understanding the significance of it, that living mainly on carboniferous foods was the cause of the long-continued dyspepsia which eventuated in the cancer. But I also knew that the cancer had been in existence for less than a year, and was able therefore to ask my informant another question: "Is it likely, is it possible that your mother can have transmitted to you that which she did not have herself till many years after you were grown up?"

This little incident is more important than it appears to be, because on this kind of evidence is apt to be built up our theory of the hereditary transmission of disease. The mere coincidence of the occurrence of a disease in mother and daughter, or father and son, is considered sufficient proof of hereditary descent. No inquiry is made into the circumstances, into the causes. I said to my informant, "Surely if you were going to get cancer from your grand-mother or your mother, it would have appeared before you were 30 years of age?"—which seemed somewhat to re-assure her. But then came of course the suggestion: "Yes but the predisposition – may not I have inherited the predisposition to cancer?" Well, of course she might have inherited the predisposition to cancer; in fact she must have inherited it; but so has all the human family, because it is a human ailment; and any of us may have anything. It depends on our circumstances, on our environment.

This fetish of heredity, as I think I may fairly call it, so blindly and superstitiously is it invoked, is one of a pair which seem to be dominating us at the present time. The other member of the pair is germs. Those of our diseases which are not attributed to heredity are said to be due to germs; and between heredity and germs, the average member of the long-suffering human family has a very poor time of it. It seems as if there was no escape for him. I have said something about germs and shall not return to the subject now.

Cases of so-called family disease very often the organic expression of family habit.

While I am referring to the subject of family disease, or diseases which, as the phrase is, "run in families," I should like to say again that, in my opinion, many cases of what is looked on as family disease are really cases of the expression by the body of family habit. Families undoubtedly have similar organisation. We cannot fail, in looking at families, to see likeness (with many points of unlikeness, however) in size, form, expression, habits, peculiarities, methods of movement, and many other characteristics. The shortest expression I can find

Organisation inherited! not disease.

for this is that families have and transmit similarity in organisation; the family organisms are similar. Now, when members of a family manifest similar or the same diseases, it is not, it seems to me, because the diseases have been transmitted, but because, having similar organisations, and treating them similarly by living alike, that is (mostly), by eating alike, they therefore, and naturally, suffer alike. Like causes acting on like organisations in succeeding or in the same generations have induced like effects. Now, no doubt, we do occasionally see the same diseases manifested by different members of families in different generations. But a far commoner experience, I think, is to find, not so much that families manifest the same diseases as this: that they manifest not the same disease, but some others which, though seemingly quite different, are really due to the action of similar causes. How often, for instance, do we find that, while elderly members of the family suffer from cancer or from rheumatism, or while one parent has rheumatism and the other has cancer, one of the daughters suffers much from fermentative indigestion, or even from ulcer of the stomach, perhaps with recurring attacks of herpes labialis, another suffers from recurring sore throats, and another is anæmic, while perhaps one of the sons has bronchitis or gout. When our eyes are opened to the causes of these affections, and when we see their dependence on improper feeding, and particularly on the consumption of an excess of starch and sugar in the diet, we see that they are examples rather of the effects of bad family habits than of family disease, and we can understand better the otherwise inexplicable fact that one or two members of the family attained advanced life, while the rest succumbed early to one or other of the affections mentioned. They probably lived longer because they lived differently. Of course I do not mean to imply by this that there may not be very different amounts of resistance in different members of the family, just as there may be differing amounts of resistance in different machines turned out from the same shop by the same maker. But machines made by the same maker, and of the same or different qualities, may be so treated as to last long and do good work, or may early be racked to pieces by being set to do work for which they were not intended and not fitted. Or they may be burned out by too large or too fierce fires, or come to a premature end by neglect of oiling and of tightening up loose screws or bolts. Or some undetected flaw in the metal of their composition may have led to the giving way and to the destruction of the machine. In just the same way, different members of a family may have different initial resistances, or even if endowed originally with equal and similar resistances, they may be overworked or properly worked, or may be properly fed and nourished. Or on the other hand, being improperly fed and

Different members of families have very different resistances, partly natural or in-born, but mostly acquired.

nourished they may come to an untimely end in consequence.

How excess of carboniferous foods is a predisposing cause of Cancer.

But as to the way in which carboniferous foods, or too frequent eating of carboniferous foods, for that is what seems to be the question—as to how these may cause cancer, it will be well to say something. The starch granule when it gets into the stomach, and later into the intestines, generates, or is apt to generate, carbonic acid gas. The oxidation of food-stuffs maintains the body heat, and the place where the heat is mainly generated (not entirely of course) is the mucous membrane of the lungs. If this mucous membrane has more work thrown on it than it can comfortably accomplish, it becomes congested and inflamed; and bronchitis ensues. The foods whose oxidation maintains the body-heat are largely the carboniferous, starchy and saccharine foods; and hence the commonest effect of an excess of these stuffs is "taking cold" or a bronchial attack, as has been seen. But before a person "takes cold" imperfect assimilation of his food has generally occurred. The gastric juice or stomach-secretion has little or no action on starch. This is so well known that one may say that the main digestive problem before chemists, physiologists, and therapeutists, in recent years, has been how to enable the economy to assimilate starch. Hence we have seen recommended such agents as lactopeptine, malt extracts, diastol, diastase, and taka-diastase, not to mention Benger's proposals to supply starch in a predigested form. When starch has broken up into carbonic acid gas and other compounds, what happens? For one thing, over-acidity of digestion in the stomach and intestines is very apt to occur; and for this alkalies, as soda, potash, bismuth, are often given; and some of the carbonic acid is no doubt neutralised in this way. But the remainder of it, and the new carbonic acid gas which is continually being generated acts as a sedative to the mucous membrane of the stomach and intestines. It acts as a narcotic; in other words it paralyses the mucous membrane more or less, or its action is exerted in that direction. The consequence of this, or one consequence, is that the intestinal follicles gape or open too widely, and when they do this they take up particles of food not yet properly elaborated, and larger than the follicles ought normally to do. The conditions therefore are imperfect chymification in the stomach, and imperfect chylification in the intestines. Following this process further, we trace these imperfectly elaborated and large particles coursing in the lacteal vessels, and conveyed into the blood. What becomes of them there? In early life they often find their way to the lymphatic glands and there set up suppuration. But in later life the lymphatic glands appear to have more resistance. The unassimilated particles of stuff coming from the food are conveyed by the lacteal system to the veins, and by the veins to the heart and the general circulation directly, or they find their way to the portal circulation first and to the general circulation afterwards. In the course of the general circulation they may become still further elaborated, partly no doubt by aeration, and partly by a secondary digestion which takes place in the muscle-sheaths and muscle-septa. Hence, when the blood is conveying many more such unassimilated particles than it ought to do, the occurrence of bronchitis and of the perimysitis, &c., to which I have formerly referred. But some of the particles may escape elaboration in either of these ways. There may be so many of them that the processes of the economy are unable to deal with them, and its provisions to overtake them. What becomes of them then? Is it impossible that some of them, say one or two, for argument's sake, may find their way into a fine capillary vessel, just capable, let us suppose, of conveying one blood corpuscle at a time? If these particles are larger than this, if say they measure a two-thousandth of an inch or more, is it not evident that they will be likely to cause a block in the circulation? To form in fact the commencement of a block, which by the accumulation behind it of blood corpuscles and of other unelaborated and unassimilated particles, may form the nucleus of an infiltration into the cellular tissue or of a tumor formation? In young persons with appetites beyond their digestive capacity, and who may not be under good domestic management, medical or other, such particles appear frequently to find their way to the capillaries of the skin, to form little blocks in this way in the skin and subcutaneous tissue, and to show themselves as acne spots. The little accumulations, in a short time, break down, undergo a process of very limited necrosis, suppurate, and are separated by thinning of the cuticle or perhaps by the needle point. From time to time, if the process goes on, larger accumulations may occur, and boils perhaps may form. Or perhaps some localised abscess may form, as quinsy in the tonsil or whitlow in the finger or thumb, some injury perhaps seeming to be the starting point in the latter case. It is a happy circumstance that so very often these small suppurations occur in parts near the surface of the body, and accessible therefore to help. How much graver would be the consequences, for instance, if even small suppurations of this sort were apt to form in internal organs, as within the capsule of the liver or in the brain-membranes. And how very serious is it, in fact, when a larger accumulation of this sort forms and breaks down in the shape of a peri-nephritic or peri-hepatic abscess, neither of them excessively uncommon; or of a pelvic abscess, as occurs so often.

Mode of formation of Abscesses about internal organs.

Every medical man must have seen samples of infiltrations in all these sites. The pelvic abscess is so frequent as to require no further reference. But I should like to mention cases of each of the others as samples of what, though they occur less frequently, most practitioners must have witnessed. Not long ago I saw in consultation a fat, flabby, middle-aged woman, a milliner, who, besides directing her business, also took her own turn at needlework. She was in a highly feverish state, gravely ill in fact, and complaining of pain in the region of the liver, besides suffering from inflammation of the lungs, which seriously alarmed the medical men who saw her before me. Diagnosing abscess in the cellular tissue around the liver, we removed over a pint of some of the most offensive pus I ever had to do with. The woman succumbed to the complication of frightful diseases from which she suffered. I may mention that her food had consisted largely of bread and butter and tea several times a day. No doubt this had acted in the usual way, by loading the blood with carboniferous waste, which, after being deposited in the muscle-sheaths and bronchial mucous membrane, had infiltrated the air-cells of the lungs, and the cellular tissue in the abdominal wall outside the liver, and also the capsule of the liver itself. In course of time the infiltrated stuff broke down, suppurated, putrefied, and led to the lamentable issue. Such cases are not in my experience so common as those in which abscesses form in the loose fat around the kidneys and in the neighbouring abdominal wall, several cases of which I recall to mind (all in men, as it happens), and two of them in persons given to the consumption of beer and alcohol. All of them recovered when the pus was let out, though all were seriously ill. But the process by which the tissue broke down and the matter formed, was quite similar to that which led to the peri-hepatic abscess mentioned, and to others which also recur to my memory.

But very often suppuration does not occur. A slow infiltration of particulate matter takes place in some part of the body, perhaps about the lactiferous vessels of the mamma, perhaps about some portion of the intestine, perhaps about the os and cervix uteri. There is generally some determining cause why this infiltration should occur in one place rather than another. In the os and cervix, for instance, there has often been present long-continued catarrh, with perhaps some loss of thin watery fluid, due to lowness of vitality, caused in turn by imperfect nutrition. A passive congestion in fact has been present for a longer or shorter time, and this passive congestion determines the occurrence of the infiltration. In other situations the determining cause may be perhaps supposed to be the congestion caused, say, by a blow. Of course it was not the blow that did it. There was present before that a long-continued state of low vitality due to imperfect nutrition caused by long-continued improper feeding and the absence of proper methodised movements ; and what the blow did was to light up this slow passive congestion into sudden activity, and more or less acute congestion. Then the infiltrating process goes on. There is plenty of material in the blood to be deposited wherever any determining impulse may direct, and it is deposited accordingly at the seat of selection. Whatever be the seat or site, we may be in doubt at first whether the infiltration is simple or malignant, that is, whether its character is such as that it may be expected to become re-absorbed, or whether on the other hand it will go on increasing in size, hardening at first, and subsequently softening, ulcerating, breaking down, and spreading. Some forms of course are quite easy to distinguish. In others it is impossible for a time to say. Different forms seem to shade off into one another by insensible gradations. But the difficulty of distinguishing does not usually exist for long, for as a rule we soon have evidence one way or other. But sometimes suspense and anxiety take possession both of the observer and his patient, and that for a considerable period. Sometimes re-absorption occurs, and sometimes when we had not expected it, suppuration takes place, and the body is relieved of the slowly-formed and offending material.

Diseased deposits or infiltrations which seem malignant, that is, cancerous, may sometimes be absorbed?

Occasionally, it has seemed to me, it has been possible by timely treatment, to modify suspicious processes, and by attention to diet and general management, to prevent the development of malignant growths. Of course this may be too hopeful an attitude of mind, though I do not think it is; it is a kind of thing impossible of proof. If such a formation, it may be said, was really cancerous, it would not go back. If it did go back it was not cancerous. Such reasoning may be correct, though I rather doubt it, inclining rather to the view that there may be threatenings of cancerous formation and deposition on several occasions, before it really takes place, and that treatment on such occasions may not only help in preventing malignant formation at the time, but also, by modifying the constitution, delay and even prevent its subsequent development. That it is possible to prevent the formation of malignant growths if we have the opportunity of advising patients early enough, I have no doubt. I think it depends on the way in which we live, whether we suffer from them or not—under 65 years of age at least, and perhaps even 70 and later. Of course, as old age advances, more and more degeneration must be expected to ensue, and no efforts may suffice to prevent the development of cancer or other fatal disease. But at earlier ages, and up to 65 at least, why should it be impossible to prevent such development? And what should be the steps taken towards attaining this end! Evidently putting the body into suitable conditions, and into suitable conditions mainly as regards the three simple and fundamental things so often referred to, proper air, proper food, and proper movements.

If opportunity given early to the medical adviser he may be able to so advise as to prevent the onset of Cancer.

As to air, I need hardly say anything. Every one knows the necessity for an abundant supply of good air, and the bad effects of overcrowding and of vitiation of air. There is no difference of opinion on this point.

Some fundamental ideas regarding foods.

But the case is different as to food. There is the utmost difference of opinion as to what is the proper food for man, different doctors giving very different advice. If I attempt to say a few words on this most important subject, I feel that the last word has by no means been spoken on it; and yet it must surely be possible to lay down a few simple principles. A mixed diet is said, I think by all authorities, to be most suitable for man. The conformation of his digestive tract seems to determine that. Assuming this to be true, we may still ask, is it necessary to have a mixture at every meal? Suppose we start the day with a mixed meal, in the ordinary way, with bread and butter—brown by preference, as being more nutritious than white—tea or coffee, eggs and bacon. Would it not be well to have the other meals made of one sort of food each—a meat meal, for instance, and a vegetable and fruit meal? But, first, as to the number of meals. I believe the most common and the most fatal habit as regards food is taking it too often. There ought to be a sufficient interval between meals to allow of the one being digested before the next one is taken. Five hours is the least interval that ought to occur between meals; and six would in most cases be better. The Roman habit as regards food seems to have been to take it once a day, for we find Celsus writing that for sound people he recommended that food should be taken twice. *Bis die potius*, he says, *quam semel cibum capere.* Two meals is

A mixed diet suitable for man.

Number of meals taken in a day. Time that ought to elapse between them.

practically the European habit in many places, the day being begun with a simple cup of coffee at seven a.m., and nothing eaten with it, while lunch is taken about eleven or twelve, and dinner about half-past six or seven. In this country, breakfast is taken about eight, luncheon about one p.m.—dinner about 12.30 by the working classes often—and dinner about 7.30, or tea by the working people about six. But these are not by any means the only meals in many cases. Not infrequently lunch is taken in the forenoon, at 10.30 or eleven, boiled bread and milk, for instance, or some tea and bread and butter; and the well-to-do classes invariably, one may almost say, have afternoon tea and bread and butter, with tea-cake or sweet cakes, between lunch and dinner. Such people really eat five times a day, or at least four times; and if they go out in the evening, as, for instance, to the theatre or some place of amusement, they often eat again on coming home. It seems to be thought by many that these little extra diets do not count. It is nothing, people say. *I believe that there is and can be no more fatal habit than that of too frequent feeding.* It is not very common, perhaps —except among servants, but who suffer more from indigestion than they?—to find a meal taken about eleven a.m., between breakfast and lunch or early dinner; but such a practice must be most severely condemned wherever it is found, for it is utterly impossible that breakfast can be digested before such a meal is taken—a basin of bread and milk, for instance, or some jam tart—or that in turn it can be digested before lunch or early dinner is taken. The same reasoning holds good for the afternoon tea meal. I am sure that much disease takes its origin from it. Lunch is still undergoing digestion. If by chance one were made sick, that would be evident enough. All the materials of the food could be distinguished for at least four hours after they have been taken. How can it be wise or physiological to add some other sort of food to a stomach which is still engaged in the act of clearing off the last meal? How can it be wise or physiological to have two supplies of food undergoing digestion, at two different stages, in the same stomach, at the same time? And yet this habit is indulged in by almost the whole community all over this country, from the working woman, who, feeling "faint," has her tea at 4.30 p.m., having dined at one, to her richer sister, who has it about the same time, and sometimes twice or thrice in an afternoon, for the same reason. Do I then think that this indication of "feeling faint" is not to be met? That nature is not to be listened to? I do not say so. I think we can meet it rationally, and we can meet it beneficially, and we can meet it safely. It often really is caused by dyspepsia, but it cannot be wise to combat it by taking more food, which, though relieving it for the moment, aggravates the trouble later. Persons who suffer from this feeling of faintness cannot distinguish between gnawing due to dyspepsia, and

Concerning fternoon tea.

hunger for which they mistake it. And they would find as much relief from taking a glass of hot water or a cup of weak tea as they do from the little meal, which is so grateful to the palate, but which in course of time loads their blood with undigested particles, destined later to cause sore throat, or a cold, or rheumatism in early life; and in later life much more serious things. I do not myself think it is the tea which does the mischief. It is most refreshing, and there seems no objection to it, if not taken too strong or too often. It is the bread and butter or cake or biscuits which do the mischief, by supplying the materials by means of which fermentation is set up, with all its evils. In the natural as well as the spiritual sense man shall not live by bread (and cakes) alone. In fact, it is not necessary, and it is positively hurtful to eat too often; to eat one meal, however small, before the previous one is digested. The same considerations obtain as regards early lunch. Let persons who feel faint have a glass of hot water or a cup of weak tea if they like at eleven a.m., but by no means let them eat then. By one o'clock they will be ready for some more food. Some dine then, and some have luncheon. If the former, three or four ounces of cooked meat with potatoes may be taken, though the boiled onion is just as cheap and more laxative, and does not generate gas so much; and that may be followed by some cooked apples or pears, or what other fruit may be in season. Any green

Recommendations regarding Diet. The food of grown people ought not to have too much body in it.

vegetable, as the Brussels sprouts, or spinach, or cauliflower, or tomatoes, or haricots verts, might be taken in place of the potato or the onion; and I think the stewed fruits are better than rice, sago, or tapioca, or other starchy pudding. Those who lunch at mid-day could have had the meal described, minus the meat. It will be said, I dare say, that there is no "body" in such a meal. Well, I admit that there is much less body in it than in a meal consisting of potatoes, bread, and rice or other pudding. But I recommend it just because there is less body in it, for I feel sure that our ordinary diet has too much body in it, and that it is the cause of our rheumatism and gout, and of our general weakliness and premature old age. Those who have dined at mid-day could have the ordinary tea meal at 6.30, brown bread and butter and tea, and perhaps an egg, and any green vegetable like lettuce or water cress or tomato, that might be in season. No supper; or if any is wanted, a cup of cocoa may be taken, or a glass of milk. It is better not to eat anything then. Those who dine in the evening could have clear soup, fish, meat, and stewed fruit, with any green vegetable in season, with cheese, if desired. Much variety is allowable, and, indeed, desirable, if food is to be enjoyed, and to perform its function in the body.

Experience of abstaining from solid food at breakfast time.

I feel sure that by carrying out one or two very simple and very easily performed suggestions regarding their food, our people might escape much illness and loss of time through illness.

and much suffering. By the simple device of eating twice a day, or at most three times, with not less than six hours' interval between the meals, of substituting the onion or green vegetables for the potato, of substituting cooked fruits for rice, sago, or tapioca, or hominy puddings, and by taking bread not oftener than twice a day, if we do eat three times, the health of our people would be very much better. As I have said, the habit on the European Continent in many places is to eat twice a day. In England it is more difficult to do this, because the habits of the country hardly allow luncheon to be taken till one or half-past one o'clock. Few of us like to go without food beyond a simple cup of coffee till that hour. I know, however, from experience that it is quite possible to do this, and to thrive on it. The evening meal can then be taken at eight or so, and the day is thus pretty fairly divided in regard of the times of taking food. Another plan is to breakfast at the usual time, say at 9 a.m., and to dine about 6 p.m., and this also divides the day pretty well. The cheapness and handiness of bread, the often-quoted remark that it is "the staff of life," and forgetfulness that this observation was made by the prince of satirists, who wrote the "Tale of a Tub," in ridicule of the Romish doctrine of Transubstantiation, and is not a divine or quasi-divine command regarding food, are the reasons, I suppose, why our people, and especially the poor among us, take bread three or

Bread the staff of life.

four or five times a day, to the great damage of their health, as shown by the great increase of bronchitis, influenza-cum-pneumonia, pneumonia itself, rheumatism, apoplexy, diabetes, and carcinoma. I name bread as the class-name, not meaning literally that all these evils are always due to it, although in fact they very often are, but meaning that an excess of starch and sugar in the diet, and the too frequent consumption of these foods are the main predisposing cause of these maladies. Of course, as I have said before, eating *any* class of food-stuffs five times a day, or four times a day, perhaps even three times a day, will, in course of time, set up disease in the body; but that which in point of fact is doing the damage is the starch, and its chief form is bread and the cereals. If somewhat heavy meals are taken under the stimulus, more or less healthy and natural, of good appetite, we are apt to be tired or fatigued when that food gets into the blood; and the well-to-do among us find tea so refreshing that we take it in the afternoon and eat something at the same time, not realising how bad are the effects of too frequent feeding. The cup of tea or the glass of hot water, in the afternoon, seems to be beneficial rather than otherwise. It seems to stimulate digestion, exciting the stomach and intestines to complete the assimilation of the previous meal, while it helps to relieve passive congestions of the internal organs generally. It also relieves thirst. An excellent practice I think

Taking hot water night and morning an excellent plan.

also is the plan resorted to now by a good many people, of beginning the day with from half a pint to a pint of hot water, an hour before breakfast. If the evening meal of the day before has been taken at a reasonable time, it will be wholly digested when one wakes in the early morning; but thirst will be quenched for much of the rest of the day, and congested capillary vessels in the digestive viscera relieved by this practice. It seems a strange thing to say; but I may as well say it since I think it; that I believe that the peri-hepatic abscess in the milliner which I have just referred to would not have occurred so soon had she taken a pint of hot water night and morning for some months previously. The free ingestion of warm fluid into an empty stomach and intestines (I am supposing that she had abstained from taking supper) night and morning would have relieved the engorgement about the liver, and if the abscess had formed at all, it would not have formed so soon. In other words, I believe that her life would have been prolonged had she adopted this plan. But if the woman had eaten less frequently, say, not oftener than three times a day; better still, had she eaten twice a day only, the probabilities seem to me very great indeed that she would have had no peri-hepatic abscess at all, nor any inflammation of the lungs; and, in fact, I believe that she would have been living now. When things had got to the point described, neither medicine nor surgery could save the woman, although the help of both was sought, at the hands of exponents of reputed skill. Her ailments were indeed incurable, but it seems to me quite certain that they were preventible, and that the simple prescription to a woman leading a sedentary life, that she should eat twice a day only, would have saved that valuable life. It is on simple things that our health depends. It is our habits in simple things that make or mar us. Few of us appear to be able to see the connection between the state of our health and our habits as regards food. But there really is plenty of evidence visible to the observant eye, and all that is wanted is plain common sense in attending to our own sensations and experience. Any one, for instance, and to take a common case, who may have tried the plan of taking tea and bread and butter on waking early in the morning for work or study, and who will compare the effects of these with the effects of plain hot water (or even weak tea alone), will not fail, I think, to be favourably impressed by the advantages of the latter course. The former seems to produce dyspepsia, while the latter relieves it. Eating too late at night seems to cause one to wake dull and heavy in the morning, tired, and with a dry clammy mouth; and starting the day with hot water is one of the best remedies for this condition. Of course, a still better plan is to arrange the time and quantity of the meals of the previous day so as not to require this assistance. Even in that case, however, the hot water in the morning does not seem to do any harm. In fact, by flushing the capillary vessels it seems to do good. It seems better at that time of day even than the cup of weak tea taken by some. Of course strong tea is bad. I quite agree with the prevalent opinion in this respect.

By means of the diet suggested, modified, of course, in such ways as will produce variety and palatability, I feel sure that many of the small ailments from which we suffer may be prevented. At least such a diet would be one of the means of preventing them. But there are tests as to what management suits us, and what does not. For instance, the occurrence, or recurrence, of small and trifling indispositions, such as slight colds, eruptions about the lips, sore throats, waking in the morning more tired than when we went to bed, and so on, ought to be the signal that we are not managing ourselves properly. We ought then to try to find out in what respects the regime is wrong, whether in respect of air (too much closeness of the bedroom, *e. g.*), or of food or of exercises. It goes without saying that the occurrence of graver ailments is such a signal; but indeed when we are incapacitated by severe illness, and especially by the recurrence of severe illness, the signal can no longer be disregarded. We are compelled to reconsider our regime and to seek advice. But it would have been much better not to have let things go so far.

Tests whereby persons seemingly in health may know if they are eating wrongly.

Before leaving this part of the subject, however, *Why Cancer recurs after removal? 1st, Because not wholly removed; because it could not be. 2nd, Because the continuance of its inducing causes has re-induced it.*

I should like to refer to one important point as regards cancer particularly, viz., its tendency to recur after removal. The analogous fact as regards the chronic diseases is that when a person recovers from one attack (say one attack of albuminuria, for instance, or chronic bronchitis) he is apt to have another, and even a succession of attacks. But the recurrence of cancer after removal is very striking and very disappointing, both to surgeon and patient. Of course one of the reasons why cancer recurs is that, before being operated on, it had in many cases infected the whole constitution through the lymphatic vessels and glands. When this is so it is easy to see, not only that it will be likely to recur, but that it is certain to do so, in fact impossible that it should not recur. If we think of it, indeed, we shall find that it is not so much a recurrence which has taken place, as a progression of the disease. It has not been eradicated because it was impossible to eradicate it. All the infected glands could not be removed. They were found to lie too close to great arteries, and especially too close to great veins, interference with which would have killed great portions of the body, and might indeed have killed the whole. But even when this extreme risk has been run, and when, for instance, a whole upper extremity has been removed in the hope of curing mammary cancer, the disease recurs all the same. Why? Because the nutrition of the body has become so impaired as to have become totally depraved. The functions have become disorganised and the tissues have reached the culmination of mal-nutrition in one direction. The causes which have led to this state of things have been acting for so long a time that they have modified, unfavourably modified, the whole organism, so that it can no longer recover, but goes on reproducing the removed disease, either at the site of removal or elsewhere.

Sometimes, however, things have not gone so far as this. We may be consulted quite early about a small cancerous formation and may be able to remove it before (so far as can be known) the glands have become affected. But even when this is so, another consideration should be borne in mind. Mere removal of an abnormal growth, whether cancerous or simple, is not sufficient in the way of treatment. Attention should be directed to the causes inducing the occurrence of the growth in the first instance, so that they may be modified; or that an effort should be made to modify them. If this is not done, what is to hinder the formerly acting causes from so acting again as to re-induce the former condition? From causing a recurrence, for instance of a simple tumour like uterine fibroid? Is not the duty of the surgeon too often considered to be performed when he removes by his operation the growth or other abnormality for which he has been consulted? Nothing being said, or far too little being said, regarding the causes of the malady, too frequently the continued action after the operation of the old causes re-induces the old malady.

A surgeon's duty not fulfilled when he removes a growth.

It will be said, I dare say, that this is not so; that it is only cancer or malignant disease in some form which recurs. A fibroid tumour will not recur, it will be said, nor will other forms of simple growths, as they are called. In point of fact some fibrous tumours do return after removal, even if the majority of them do not. And in some situations it may be said to be the rule that when some fibrous tumours are removed, others form in the neighbourhood, even if the very same ones do not recur. And as regards the division of tumours into simple and malignant, besides the criticism that naming diseases simple on the one hand, and malignant on the other, is a piece of circular reasoning too often (the disease was malignant because it returned, and it returned because it was malignant); besides this, we are apt to forget certain essential facts. For instance, even if a fibroid tumour may not recur, does nothing form in its place? Does the patient remain quite well? In many cases, no doubt, he does. Some simple tumours, a small mass of adventitious fat, for instance, are no more an indication of general involvement of the whole body, are no more the local manifestation or expression of a general state, than would be the accidental occurrence of a supernumerary finger or toe. To remove either the fatty tumour or the supernumerary digit, especially if it were done with a little skill, would probably have no effect on the general nutrition of the body, or on its general circulation. Similarly with the removal of, say, an inflamed sebaceous cyst. The removal of this, it might be hoped, would be followed by no general disturbance ; nor would the existence of an inflamed sebaceous cyst necessarily mean anything more than the existence of a slight local ailment. Even here, however, I suppose in strictness a slight local inflammation ought to be viewed as the local manifestation of a generally disturbed circulation ? Different views might perhaps be taken of this question. When we come on, however, to consider the existence of a wen, and especially the existence of a succession of wens in a person, one new growth, or a group of new growths, appearing after the removal of one or of a group of others, and especially if the process of the recurrence of such growths were to go on for an indefinite length of time, we insensibly begin to introduce new considerations. We still, perhaps, speak of the occurrence of simple tumours, but we begin to presuppose in the person suffering from them a special tendency to their formation ; or by some phrase of that sort we begin to infer something like a modification of the general constitution or predisposition of the patient. Sometimes, even, we may fancy that the removal of some simple outgrowth may have been followed by some other ailment, by some rheumatic trouble, or an attack of gout, or some malady which suggests that the general nutrition has become affected. There are, again, recurring forms of what are called simple tumours, some forms of fibroid, for example, which recur after removal. When dealing with or considering these and their characters, we perhaps attribute more of a general constitutional character to them, and may think their occurrence not entirely explicable by purely local facts or considerations; and we may even find ourselves doubting whether they should be viewed as simple or as malignant. The malignant growths unfortunately recur almost invariably; but some of the simple growths are very apt to recur also; and there seem to be intermediate forms between the so-called simple, and the so-called malignant growths, which shade off from one another by insensible gradations; while there are some intermediate forms of which we cannot for a time say whether they are simple or whether they are malignant. The only possible way in which (besides removal) recurrence of cancer or other growths can be prevented, must be by attention to causes, and by an attempt to modify them. But too often we hear far too little of causes. Obviously, however, to remove an effect, and to say nothing respecting its causes is a proceeding altogether futile, and doomed therefore to ultimate failure so far as cure is concerned. I cannot help thinking that I have seen quasi-growths or depositions of matter which threatened to be malignant, but which after a time became absorbed and disappeared. And it has seemed to me

No real dividing line between simple and malignant growths.

Simple growths (so called) may recur as well as malignant.

that if no attempt was made to modify the causes of these, or to alter the nutrition of the person, these formations have recurred, and in due course one of them has been pronounced to be malignant. On the other hand, if the patient has been seen soon enough, and has been able or willing to take the advice offered, she has been enabled to escape the recurrence of such alarming conditions, or may have been enabled to postpone them for a very long time.

Diseases are long-lasting in proportion to the predisposition of the patient, and to the length of time during which their causes have been in operation.

This seems perhaps the most suitable place to introduce the statement of one of the laws of the occurrence of disease in the body that is not infrequently enunciated by the lay public, or which seems at least to have emphatically impressed their minds. The remarks made in the course of these observations have to a greater or less extent implied it more than once. I mean the law that the hold which diseased states have on the economy is strong in proportion to the length of time during which they have been in operation. Perhaps a fuller statement would be to say that this hold is strong in proportion to the length of time during which the inducing causes have been acting, and also to the weakness or delicacy of the person or constitution acted upon. A more usual mode of expressing the last factor would be to say that the hold is inversely as the resistance of the patient. Inverse resistance we formerly saw to be the equivalent of predisposition, so that the law might be expressed thus: Diseased states affect the organism in proportion to the length of time during which their causes have been in operation, and to the predisposition of the patient (here of course the term predisposition is used strictly in the sense already defined, not in the more or less vague or metaphysical sense in which the word is often used). From the point of view of treatment, which is the standpoint from which a practical public view it for themselves or for their friends, the translation of this law is that to treat affections whose causes have been acting slowly and insidiously for a long time, a long time is required. Obviously, not only is this the case in point of fact, but it must be so. To treat cancer successfully therefore, if such a thing were possible—which unhappily it hardly ever is, though it should not be overlooked that a very few cases recover—a very long time would be required. This is a reason, as before observed, why the mere excision of a cancerous growth can never of itself offer the prospect of cure; it is a reason why the hope for patients suffering from cancer can never be in the use of the knife alone, although the knife may in suitable cases be one of the aids to cure. It has been said that starvation offers the only hope for relief or possible cure in cancer, an opinion which, so far as I can see, is about as near the truth as any I have seen enunciated. For if cancer is caused, as I have suggested, by the slow accumulation in the blood of

Therefore the treatment of long-lasting diseases demands a long time.

Starvation to a greater or less extent the chief means for the treatment of Cancer. As also for the treatment of the Chronic Diseases.

waste and unassimilated materials mainly from the digestion, if cancer is the culmination of mal-nutrition in tissue, what so likely to afford relief (if we can hardly hope for cure) as the attempt to make the organism slowly use up its own accumulated waste stuff? But indeed this is our main help to cure in all the chronic diseases. A shrewd middle-aged man, who consulted me recently on account of congenital heart-disease, which was in course of time followed by kidney-disease, described how 'he had pined (starved) the dropsy out of him!' He had had to fight hard with long-continued disease during nearly the whole of his life, and that was his conclusion. I have no doubt he owed his life, and what measure of health he had regained, to his observant reading of the facts of life as they presented themselves to him. This is the reason why patients so often lose weight when being treated for chronic disease. If we are to cause a re-absorption of the material, which, by its deposition in various internal organs, causes chronic diseases, how are we to do this without causing general absorption of tissue? Plainly it is in this way that we must set to work. But few persons will submit to this. The medical profession are, I believe, somewhat to blame for this reluctance. We have so persistently inculcated the view that the strength must be maintained, and that it must be maintained by the administration of abundant nutriment, and by implication have so persistently asserted that increase of weight is increase of strength, that when patients find themselves losing weight, nothing will make them believe that they are not losing vitality; and so, comparatively few will submit to the only treatment which has any prospect of relieving them.

Decrease of the weight of patients not necessarily decrease of strength, and vice versâ.

But treatment which makes patients use up some of the waste stuff in the body (cancerous infiltrations for instance, or the deposits causing chronic inflammations, or even serous effusions into natural cavities) causes and must coincidently cause absorption of some more or less sound tissue also. It is only through the general circulation that we can reach such deposits caused by long-continued passive congestion, and when such deposits are being used up by the economy, and passed into the general circulation, obviously, other tissues are liable to be absorbed also. It has been shown by physiologists that certain tissues are absorbed and used before others. Dr. Dewey, of Pennsylvania, with whose views I am glad to find myself in general accord, and who seems to have made the same attempt as the writer to view the facts of medical practice from an independent and, may I say, original standpoint, quotes a table of great significance from Dr. Yeo. Besides quoting it in the text of his book, "The True Science of Living," Dr. Dewey places it in capital letters in the frontispiece of his book.

Dr. Dewey on "Nature's Bill of Fare for the Sick."

He calls it Nature's Bill of Fare for the Sick; and he shows that in illness, when we are using up the materials accumulated in our bodies, we may use as much as 91 per cent. of our fat (practically all of it), that of muscle we may use as much as 30 per cent., that the spleen may waste to the extent of 63 per cent., the liver as much as 56 per cent., and the blood itself be absorbed to the extent of 17 per cent. of its total amount. But even when wasting to this extent has occurred, the curious and significant fact is emphasised, that the *Brain and Nerve centres may not have wasted at all.* The controlling nervous system thus does not lose its power till the very last. Generally, however, the wasting process does not require to be carried to the very last, the chronic inflammatory deposit (and in rare cases even a cancerous infiltration ?) being absorbed and got rid of before this point is reached. Even, however, when it is not possible to induce healthy action in malignant growths in this way, some absorption is induced in them, and by this means it is often possible to reduce the terrible gnawing, stabbing, recurring pain of cancer, even although its onward fatal progress cannot be prevented. It is probably in this way that the frequent sipping of small quantities of water (pretended or perhaps believed ? by some of the followers of Count Mattei to be gifted with various electric powers and virtues), amounting to a pint or more in a day, has mitigated the terrible pain of cancer by relieving the capillary congestion of the viscera, and especially of the kidneys, so allowing them

May even cancerous deposits be occasionally absorbed ?

to act and relieve the system, even although it has not prevented the fatal issue. As most, if not all, of the chronic diseases depend upon the deposition of waste unassimilated materials in various situations, or, in other words, depend on a blocking of the local circulation in this way, a little wholesome starvation is generally of vast benefit by inducing the economy to use up some of its waste stuff. Nature herself points the way to us in this matter, because when things have gone as far as she can bear, and when, were things to go on in the same way, death must ensue, she generally throws the patient into bed with a digestive system entirely disorganised, taking away all appetite for food and all power of assimilation for the time being. We may, in such circumstances, do much harm by efforts, too persistently made, to feed our patients; but generally they refuse all sustenance for some time. After a while (Dr. Dewey does not seem to be afraid if his patients refuse all food even for as long on some occasions as thirty days continuously or even longer) they right themselves, the tongue cleans, appetite returns, the power of assimilation is re-established, and recovery takes place. It strikes me as somewhat curious (and yet, if we both look at the facts of life candidly and impartially, perhaps it is not curious) that observers so wide apart, and in circumstances so very different as the conditions of human life must be in Yorkshire from what they are in Pennsylvania, should come to conclusions so practically similar as Dr. Dewey and the writer have reached. If in cancer we cannot hope for recovery, or if we can hardly ever do so, we may, perhaps, still hope for the amelioration of such symptoms as pain. A case recently came under my care, in which a woman, aged 46 years, suffered from a large cancerous infiltration into the pelvis. By and bye, cancerous nodules appeared in various parts of the abdominal wall, and passive effusion of fluid occurred into the peritoneal cavity (that last mark of profound illness). I recommended a very spare diet of milk, lime water, and white of egg, what was practically a starvation diet, in the hope that the organism would begin to use up the waste material deposited in the tissues, and possibly at the same time the cancerous growth, or some of it. I found the specific gravity of the urine 1030, instead of 1015—1020, as it ought to have been, a fact which corroborated my view (went, indeed, to help to form my view) of the mode of onset of her disease. At the end of a week the urine was no less turbid, nor was the specific gravity any less. At the end of the second week there was still no change in either of these particulars, nor was there any improvement at the end of the third week. It was quite plain to me that the high specific gravity and the turbidity were being maintained at the cost of the woman's body. At about that time general wasting became plainly visible, and at about the same time we were much troubled with sickness, the food becoming sour, and the stomach ejecting it. I suppose the milk was undergoing the lactic acid fermentation. The diet had to be altered. For a time she took for breakfast only a cup of coffee with milk. For dinner she had soup and a well-cooked green vegetable, following on with the milk and lime water in the evening. For a time this seemed to suit her. At about the end of six weeks the specific gravity of the urine fell to 1010, and the excretion itself had cleared. The end I had in view was being to some extent accomplished, and even the cancerous mass in the pelvis shrank somewhat, and the pressure on the bladder became less. But the improvement was not lasting. In time, sickness returned, the further steps in the course of the disease above-mentioned making their appearance; and in a short time the woman left the Infirmary, in order to be among her own people when the inevitable should come. The predisposing causes of the cancerous disease were in this case also the usual excess of carboniferous foods, which had for years formed nearly the whole of her diet. When I saw her, nutrition had become too profoundly modified, and vitality had fallen too low for the condition to be cured. But I cannot doubt that, had she been seen, say, some years before, when too great stoutness and some indigestion were the only things from which she was suffering; and had the carboniferous foods which formed too great a part of her diet been diminished, something could have been done for her. I think indeed that her fatal illness might have been indefinitely postponed, and perhaps altogether prevented. The case seems to me to teach also the other lesson which I have several times said appears to arise in the treatment of cancer. The nature of the growth was not in itself such as to allow us to entertain at any time the hope of benefiting her by operation. But if it had been so, and if the cancerous infiltration, in place of occurring into the pelvic cellular tissue, had taken the form of say a cancerous enlargement of the ovary, which, being a well demarcated organ, might have been removed—if, I say, this had been so, what would have happened? No doubt the growth would have returned either in the pedicle or in some other portion of the body. Even if sound advice had been given to the woman regarding her food, and if she had conscientiously followed it, even then I fear the growth would have returned, the general nutrition having been for too long a time and too profoundly lowered to allow of recovery taking place. The hope for these patients is not in the surgeon's knife; nor does it lie in this direction alone for potentially cancerous patients generally; but it is, on the other hand, to be looked for in dietetic and other management at earlier stages, and lies in fact in the direction of preventive medicine. Preventive medicine must in fact enlarge her scope and aims, and as she has achieved noteworthy successes in

The hope for Cancer not so much in the surgeon's knife as in preventive medicine.

the domain of consumption and the fevers, must press on to the prevention, or at least the postponement, of the onset of cancer as well as of the other deadly and insidiously starting chronic diseases. Dr. Dewey of course knows nothing about the case just detailed. I can only infer from what he has said about his general views how he would have set about its treatment if he had been consulted. Neither are his phrases and forms of expression such as we should use here. By the expression "Evolution of the Breakfast Table," for instance, he seems to mean the abolition of the taking of solid food at breakfast-time. I do not know if it would be good American to speak of the evolution of slavery as having arisen out of the American civil war? But it would not be good English. We should speak of the abolition of slavery. By the phrase evolution of disease again we should mean the production of disease; and the use of the expression would imply an opinion that disease had been produced slowly step by step, rather than created or produced suddenly. We should not use the expression evolution of disease as synonymous with abolition of disease which Dr. Dewey seems sometimes to mean. But the abolition of solid food at breakfast-time was part of my plan of treating the poor woman in question who was suffering from cancer, and, the question of naming and of expression apart, I gather that it would have been his plan also. Although that plan stopped the sickness and ejection of food for a time, its application was too late. Death was by that time inevitable. But what if it had been adopted some years before? Two to five years before? It seems to me, I must say, that had this been so (before the blood had been so thoroughly loaded with waste matters that nothing, not even absolute starvation, would have cleared it), the abolition of breakfast, and placing the woman on two suitably selected meals a day, and far enough apart from one another, would either have indefinitely postponed the onset of her fatal illness, or might have prevented altogether that mode of the termination of her life. In this particular case also, heredity has had nothing to do with my patient's illness. Her mother was still living when she came under my care. It was the patient's manner of living which brought on her fatal illness. And any human being may suffer from any human ailment, whatever may have been the state of constitution of their ancestors, or of their family.

I have said nothing hitherto, except, indeed, by implication and by way of reference, regarding the third great modifier of health and cause of disease, viz., Exercises or Movements. If not so important as food in their effects on the body, exercises have still a most important influence on life and health; and much might be said regarding them, much more than in these concluding passages I can have the opportunity or the space to say. Much has been written on the value of exercises, both in ancient and modern times; and yet it is still almost a truism to say that their importance, even when theoretically recognised, has not received adequate practical consideration. The public school education of England has always laid great stress indeed on the value of games and exercises, the influences of which have been most beneficial on the health of her youth. But until very recent times this means of development has been almost wholly neglected in the case of girls; and still it is so common as to be almost the general rule that exercises form no part of the daily life of adults of either sex. It seems to be thought that the performance of the business of life will provide sufficient exercise for the various muscles of the body. At least, nothing is so common, when exercises are recommended, as for the medical man to be told, "Oh, I am moving about from morning till night. I cannot require exercise. If anything, I have too much." No doubt an occupation which involves a good deal of movement is better than a sedentary one. But the muscular movements involved in the performance of the business of life are very often monotonous, and involve the performance over and over again of the same, and that a limited number of motions. There is no methodising of movements or of exercises. Take, for instance, the life of the woman doing domestic work. Her occupation is varied enough, certainly. To be one's own cook, and housemaid, and charwoman, and nurse, and laundress all at once, or at short and alternating intervals, seems to imply the need of making a large variety of movements. And yet even with all these, certain muscles hardly get exercised at all. How stiff many of the women so occupied, all day long and day after day, become in the muscles of the back, for instance, is well-known to those who have to advise them. And how full of pain, and sore, and aching, and tender, are many of those women, may easily be discovered by any one who inquires into their condition. Many of them are in such a state that on the slightest tap or knock, their muscles become black and blue, extravasations taking place into their substance, so soft is their structure and so low their nutrition. It will be said that this is due to wrong feeding perhaps; accumulations of such substances as paralactic acid, uric acid, butyric acid, xanthin, hypoxanthin, inosit, and so on, taking place in the muscles and finding their way there in great measure from the food. While this may be admitted, and while indeed from what has been said already in these observations, this must even be contended; still it must also be argued that much of the evil is due to the want of methodised exercises; and, of course, absence of fresh air tells on women (and men) who are too much confined indoors. In fact all the three causes of impaired health are at work, too little fresh air, improper feeding, and the absence of methodised movements. It is with the last I wish now to deal. People have difficulty in realising that

Persons may be over-worked and under-exercised at the same time. Women especially often are both.

they may be both overworked and under-exercised at the same time; yet this is literally true, it seems to me, not only for those who, let us suppose, over-work their brains with literary or other mental work, and who use their muscles very little, but even for those engaged in the continuous domestic occupations referred to, for which a good deal of muscular movement is required. It is an interesting thing also that the performance of methodised movements for ten, fifteen, or twenty minutes twice a day, not only does not add to the fatigue of persons so occupied, but positively diminishes it and enables them to do their daily work better. It is better to rest a little after these movements; but if, for instance, they have been taken in the morning before breakfast, sitting down to that meal affords all the rest required, so that no extra time is required for rest by persons who are able to be up and about. Few persons are so much occupied that they could not spare the time required for exercises. What sort of exercises? The ancients appear to have used two main sorts, what they called *gestatio*, and what was called *exercitatio*; or what we should now term passive and active movements. On the whole a good deal of importance seems to have been attached to exercises by the Roman physicians. I do not suppose for a moment that their advice would be followed by the mass of the people. The social condition of the population would act as an effectual barrier to that, as unfortunately it still

Ideas of Celsus regarding active and passive exercises. Exercitatio, gestatio.

does to a great extent to the mass of the people in our own day. But we find Celsus writing after this fashion? "He whom either domestic or civil duties have occupied during the day ought to set apart some time for the care of his body (curationi corporis sui), and his first care is exercise (exercitatio), which ought always to precede food. And exercise ought to be more elaborate (amplior) in the case of him who has worked little and has been well supplied with food (bene concoxit), while it should be less in the case of those fatigued with labour and who may have digested less."

As to passive movements "the most gentle gestation," says Celsus, "is that of a ship, either in a harbour or in a river; the more violent is on the high sea or in a suspension-couch (lectica), more violent still is that of a carriage. And indeed each of these may either be intensified or rendered more gentle. If there be none of these things within a man's reach, a bed ought to be suspended and moved from side to side. If there be not even that, a prop is to be put under one foot, and by this fulcrum the bed is to be propelled backwards and forwards by the hand."

A rather strange, but certainly interesting, picture, this of the passive movements which were prescribed for patients in the second century of the Christian Era! It is to be hoped that they were beneficial. The active exercises were, on the other hand, "reading aloud (clara lectio), the use of arms, the ball. Running and walking are," he says, "very convenient exercises; the latter of which would be more advantageous if not on a plane, since the body may be exercised better by an ascending and descending variety, unless it be very weak. And it is better in the open-air than in a portico; better in the sun (if the head can bear it) than in the shade; better in a shade formed by walls and shrubberies than that which is under a roof; a straight walk is better than a winding. But incipient perspiration ought generally to terminate the exercise, or at least lassitude short of fatigue, and even in this itself it ought to be sometimes more, sometimes less. And indeed there ought to be no fixed rule *(nec certa esse lex)* nor immoderate labour in these exercises, in imitation of the athletes. Unction very properly follows these exercises sometimes; either in the sun or before the fire; at another time a bath, but in a chamber as high, light, and spacious as possible." . . . "After these things it is necessary to rest a little."

The bath among the ancients.

The elaboration of the bath also is well known to have reached some perfection among the Romans, with its Tepidarium, Calidarium, and Laconicum, its Solium, Piscina, and Frigidarium; besides the adjuncts of the Aquarium or Reservoir, the Vasarium or place for holding the vessels where the water was heated; and the Hypocaustum or Stove.

If we set aside the somewhat fanciful arrangements and advice as to passive movements *(gestatio)*

I think we must admit that the physician who recommended the arrangements for active movements *(exercitatio)* knew what he was talking about, and gave good advice. He may not have known anything about oxidation, or about the accumulation of various waste products in the muscle-sheaths. Still less could he have named those products; but his juxtaposition of digestion *(concoquere)* with movements *(gestatio* and *exercitatio)*, and his clear perception of their interdependence and relations to one another, mark him out as possessing the insight required by the accomplished physician of all times. It is the same man who compelled our admiration before when we read his advice to the medical man, not to rush into the sick-room and seize the patient's arm immediately, as he enters the chamber, "but let him sit down first," he says, "with a cheerful countenance, and inquire how he finds himself; and if he seems alarmed he ought to soothe him with some suitable observations *(probabili sermone lenire)*, then he may apply his hand to the body." What more could the finest teacher say to-day? And in what respects are we who know of the circulation of the blood so much superior to him who, though he did not know it, still felt his patient's pulse and was still aware that many causes might be affecting it, such as exposure to the sun, the bath, exercises, and emotions like fear and anger, all of which must be allowed for if the true condition of the pulse was to be known, and its meaning appreciated?

Ancient physicians, although ignorant of the circulation of the blood, still felt the pulse.

Games. As to the exercises themselves the reader may ask of what sort should they be. They should be arranged so as to move in a methodic manner all the muscles, not, as is too often the case, to move some muscles to the exclusion of the rest. Games are of course most useful for this purpose. The games ought to be such as are not too violent. For young people of course more freedom and rapidity of movement and more exertion are allowable than for middle-aged and elderly persons. Cricket, which involves both the action of running, and the many movements of throwing, catching, striking, and finding the ball is of course an admirably contrived set of exercises. Football also might perhaps be so if it could be relieved of its present drawbacks. A game which involves wrestling, and struggling so fierce as to wrench, and strain, and sprain muscles and ligaments, fracture collar bones, shoulder blades, ribs, and legs, and do other grievous bodily injury, may be a good game and a well-devised exercise in itself, but it is in need of reform. Lawn tennis also is a very good game, its few drawbacks being comparatively easily overcome. Golf seems to be in all ways a most admirable game; and no doubt there are others, as billiards, &c., which are suitable. Walking the deck on shipboard has a fascination for many people, providing exercise in the open air with the least possible fatigue, and having the advantage that it can be stopped at any moment that fatigue suggests, and can be as readily resumed. Walking, running, leaping, fencing, boxing, the use of the rings and parallel bars, and the various movements involved in the use of arms are all useful and of much benefit to those who can indulge in them. Mention should also be made of the use of the bicycle and tricycle now so much in vogue. No doubt, most valuable exercises can be obtained by means of them. The writer feels strongly that they are very useful, particularly for women; and it is even to be hoped that they may be the means of preventing some of those cases of chronic invalidism among young women, which have often in the past been at once the despair of the medical profession, and a great trouble and cause of despondency to the sufferers themselves and their friends. No doubt it is in food and exercises that the causes of these depressing and long-continued ailments are chiefly to be found; and the bicycle offers a means of supplying a useful form of the one necessity, while by stimulating the digestive powers to greater activity, it will also help to supply the other aid to healthy life. The use of exercises without the drawbacks of the solitary and more or less objectless walk, such as is offered by the help of the bicycle, together with such alterations of the diet as may seem indicated in each particular case, offers at least in combination one of the best means for the relief and cure of such cases. Of course all good things must be used in moderation. Already there are whispers of the overuse of this form of exercise (as from time to time there are also of others). It is devoutly to be hoped that abuse of a form of exercise, very good in itself, may not justify, or seem to justify, a denunciation, which, even if merited by cases of abuse, will be likely to restrict its proper use. There is nothing to hinder, but everything to recommend the prescription of the use of bicycle exercise (and this applies to all other exercises as well) for such lengths of time as patients can bear, whether for half-an-hour or an hour or two hours or more, according to the needs of each particular case. The marks of a well balanced mind are that we should use those things which are helpful to life in a more or less equal and equable manner, with variations of less or more indeed according to the varying circumstances of the moment, and according to the varying needs of life; but that on the other hand we should avoid those extremes of rush and torpor, of too excited use alternating with unmerited neglect, of too enthusiastic recommendation and too vehement denunciation, which are the characteristics of want of balance in the mind of the individual, of the community, or of the medical profession.

All these modes of exercise, however, require much time, and many of them involve more expense than can be afforded by the average man and woman, who much miss exercises, especially now that so many of the board schools employ movements so admirably adapted for training boys and girls. It is too often a satire on those who are ill, to advise that they should resort to out-door exercises. However admirable the advice is in itself, it is too often impossible to follow it; and indeed, had it been possible to adopt and adhere to it, the patient might not have been ill at all. But there are few so poor as to be unable to afford 5, 10, 15, 20, or 30 minutes to methodised movements twice a day, movements devised for the exercise of all the muscles of the upper limbs, of the head and neck, of the ribs and trunk, of the abdomen, of the flanks, of the thighs and legs. And every one who wishes can suspend a pair of rings from a beam in the roof, or can use light dumb-bells or clubs, even if he cannot find time or means to visit a gymnasium regularly. Of course the society found at a gymnasium is of great value, and must be recommended to all who can make the opportunity to visit one. For those whose time is limited, or who for other reasons cannot use gymnastic instruction, nothing could be better than to read the little book, say, of Dr. Schreber (Leipzig, Fleischer) entitled, "Aerztliche Zimmer-gymnastick." This little gymnastic instructor, "made in Germany" and now in its 25th edition (the last edition being of 10,000 copies), gives wood-cuts of a large number of muscular movements and bodily positions, most admirably devised, and as pictorially instructive to those who cannot read German as to those who can. It says much for our German friends that there should be among them so great a demand

Literature of exercises.

for so useful a book, and offers an example which all would do well to follow both in this country and elsewhere. I might also mention the chart published by Professor Dowd, of New York, as offering an excellent pictorial exhibition of useful movements.

There are also other valuable guides to methodised exercises. Especially does attention seem to have been bestowed on these in the United States of America. The foundation of such literature in modern times is, of course, the Swedish system inaugurated by Ling. But as a development on this we have the handbook of school gymnastics by Baron Nils Posse (Lee and Shepard, Boston), a small but well-arranged set of progressive exercises for children. Then there is the physical culture of Louise Preece (C. W. Bardeen, Syracuse, N.Y.), which deals not only with systematic exercise and movements, but also to a considerable extent with the expression of the emotions by gesture. And a little book by Edwin Checkley, entitled "A Natural Method of Physical Training" (London: 24, Bedford Street, Strand; and New York, 27, West Twenty-third Street, G. P. Putnam's Sons), ought to be mentioned. This work describes exercises without apparatus. Then there are "Sound bodies for our boys and girls," by William Blaikie (London: Sampson Low, Marston & Co.), and "Modern Gymnastic Exercises," by A. Alexander, F.R.G.S., both of them very good books. All of these works give valuable information regarding exercises and the methods of performing them, and may be consulted with advantage. And no doubt there are others.

Best times for exercises.

With these representations before one, it is possible to avoid the verbal descriptions which would take up much space, and which would not then be so clear as the woodcuts themselves. And I can go on therefore to say, respecting muscular movements, that the best time to take them is before a meal, as Celsus says, or *immediately* after, before digestion has fairly begun; otherwise it is not wise to take them say a couple of hours after food, as then digestion is in full swing, and the economy ought not, so to say, to have its attention disturbed when engaged in the digestive process. Four or five hours after a meal, on the other hand, and an hour or so before the next one, is a suitable time, as the movements, especially if aided by the drinking of say half a pint of water, stimulate vitality, increase oxidation, improve the power and rapidity of the circulation for the moment, and stimulate the digestive viscera to complete the digestion of the previous meal. There is another thing which these movements are calculated to effect, viz., that, by stimulating the rapidity and power of the capillary circulation, they tend to prevent the deposition in the muscle-sheaths, nerve-sheaths, and periosteum, of those waste products which are apt to be filtered out of the blood at

How exercises benefit the body.

that time, and being laid down in these situations, to be the cause of much neuralgia, rheumatism, periostitis, &c. The increased oxidation tends to consume and use up many of these products, and so to prevent disease. The best time for exercises seems, therefore, to be in the morning before breakfast; and the indication seems to be that they should form part of the act of dressing. The proper use of them involves getting up, say, twenty to thirty minutes sooner in the morning, which is not a bad suggestion for any of us. For very delicate people (who, however, in this case must also have the leisure which does not fall to the lot of all) the morning movements may be taken immediately after breakfast; after which the ordinary business of the day may be proceeded with, as by change of occupation what really often amounts to a rest is so produced. I think movements ought to be had recourse to once again in the day at some convenient time. The organism does not seem to retain the impress of actions of this sort for more than twelve hours. If the next set of actions happen twenty-four hours after the previous one, the organism forgets, so to say, the lessons of the previous occasion, and the work has to be begun afresh. The muscles do not seem to benefit so much by the previous exercises. Of course once a day is better than not at all, but, to parody the words of Celsus about food, it seems to me it is much better to have exercises twice than once a day, "potius bis die quam semel exercitationem capere." If this be admitted, the best time for the second set will be about four or five or six o'clock, according as people have more leisure time. The well-to-do have usually a toilet to perform then, and the work-people return from their occupations about the later hour. If the bath has been taken in the morning, there is no need for another then; but if not, and if there is leisure for it, the addition of a bath to the afternoon exercises will add to their refreshing influences, and to the feeling of ease, lightness, and freshness which they induce.

To briefly recapitulate what I have attempted to show in these observations, I should be disposed to state the following propositions:—

(*a*) There are three great predisposing causes of health and of disease, viz., the relations subsisting between the economy and, 1st, air, 2nd, food, and 3rd, movements or exercises or work.

(*b*) The improvements which have taken place in the public health, and which are seen in two directions, and in two directions only, viz., a diminution in the incidence and mortality from fevers and from consumption — these improvements have been effected by directing attention to one of those causes, viz., air. Except in the case of water, whose influence has been studied, the general effects of food and of movements have hardly been considered at all.

(*c*) The effects of improved surgery, though very brilliant and very important in individual cases, have exerted no appreciable improvement on the public health. If improved surgery has added thousands of years to human life in England, improved medicine (including under this heading the effects of sanitation) has added millions.

(*d*) The commonest effect of improper feeding and the absence of exercises is to induce a condition which has been called *triphthæmia*, whose definition has been given. The commonest species of triphthæmia is *triphthæmia carbonifera*. There may be other species, as, *e.g.*, *triphthæmia nitrogenosa* or *triphthæmia ex olere*, or *triphthæmia e pomo*. *Triphthæmia ex olere*, or *triphthæmia e pomo* are not, however, very likely forms to be met with, since neither green vegetables nor fruits contain as a rule the materials in their composition which are likely, by accumulating waste matters in the blood, to lead to the production of triphthæmia. True gout is a good and well-known representative of *triphthæmia nitrogenosa*, but it is far less common than the various phases of *triphthæmia carbonifera*.

(*e*) Triphthæmia carbonifera is largely due to an excess consumption of starchy and saccharine foods.

(*f*) Triphthæmia carbonifera has many phases or manifestations, and shows itself in the occurrence of such diseases as herpes labialis, tonsillitis, bronchitis, rheumatism, eczæma and pruritus, caruncle, erysipelas faciei, apoplexy, influenza and pneumonia, Bright's disease, diabetes, and carcinoma.

(*g*) Attacks of disease recurring at long intervals of time imply causes at work in the organism acting at short intervals of time. Also, constant causes acting on the economy shew themselves, not in constant, but in periodic effects. The presence of stone in the kidney, for example, is shewn not, as a rule, by the existence of constant pain and hæmaturia, but by periodic or intermittent attacks, with periods of more or less complete comfort between them.

(*h*) Carcinoma is the culmination of mal-nutrition in tissue. Although nearly always incurable, it is preventible by proper attention to food and exercises ; under the age of 65 years, or even 70.

(*i*) The following dicta regarding carcinoma are probably correct in fact in England at the present time (although too frequent feeding on *any* sort of food would very likely induce cancer):—

i. Carcinoma in England is never, or hardly ever, produced by the consumption of green vegetables. *Carcinoma ex olere nunquam fit.*

ii. Carcinoma is never, or hardly ever, produced by the consumption of fruit. *Carcinoma e pomo nunquam fit.*

iii. Carcinoma is not often, but sometimes, perhaps, produced by the consumption of flesh. *Carcinoma e carne aliquando sed raro fit.*

iv. Carcinoma is often produced by the too frequent use of bread. The use of bread five times a day for twenty or twenty-five years is almost certain to produce carcinoma, unless the patient has in the meantime been swept away by some other of the diseases named in proposition *f*. But indeed, the use of any sort of food five times a day for a long period of time will almost certainly induce fatal illness of some kind. *Carcinoma e pane saepius fit.*

v. Carcinoma is most commonly produced by the too frequent use of starch and sugar in the diet. *Carcinoma ex amylo et saccharo saepissime fit.*

(*j*) No disease occurs in the body unless the material or pabulum therefor is first found in the blood. *Morbus nullus in corpore cujus materies non prius in sanguine.*

(*k*) There is nothing in the blood of an adult which has not been introduced by the food or by the air. *Nihil in sanguine quod non prius aut in cibo aut in aere.*

(*l*) The other diseases mentioned in proposition *f* are for the most part curable and preventible by attention to diet and exercises ; and the carrying out of a few simple suggestions regarding food and exercise would probably make a great difference for the better in the health of the people.

(*m*) Heredity is of far less importance as a predisposing cause of disease than are the habits of the individual. The effects of heredity are stronger in early life. Those of personal habits increase as life advances. The main law of heredity in disease is the following:—"Like causes acting on like organisms in succeeding generations induce like effects." In point of fact, we are far too prone to attribute to our ancestors diseases which are the effect of our own conduct.

(*n*) The influence of germs on the organism is of far less importance than is the state of the organism which they influence. The best sort of a-sepsis is the a-sepsis of a healthy body ; and a body is made healthy by abundant air, proper food, and exercises or work. In this healthy condition the body, if exposed to the influence of germs, will oxidise them off and take no harm.

(*o*) Predisposition to disease is inversely as the resistance of the organism. In other words predisposition is inverse resistance. Resistance is increased or diminished, or, on the other hand, predisposition is diminished or increased, by proper relations between the economy and air, food and movements. The exciting causes of disease are such things as cold, heat, wetness, dryness, storm, fatigue, &c. The resistance of the organism to these is increased by proper management of it in relation mainly to air, food, and movements. As the causes of disease have always been considered to be the combined influence of the two sets of agents, viz., the predisposing and the exciting causes, it follows that a main part of the problem of medicine is to express the predisposing causes of disease in terms of the influence on the economy of air, food, and movements. In other words, predisposition ceases to be dependent on metaphysical considerations, and we see on the other hand how it may be possible to define it in scientific terms.

(*p*) The interests at stake dependent on these simple considerations are vast and, indeed, almost incalculable. An addition of five years to the average duration of life of the forty millions of people living in the United Kingdom would mean the addition of two hundred millions of years to the active lifetime of a generation. Already it is computed that something like 125 millions of years have been added to the early periods of the lifetime of this generation by the sanitary improvements connected with the efforts to provide an abundant supply of pure air. While we shall not go back on this policy, much improvement may further be effected by attention to food and exercises. If the latter were done, the gain would accrue to the more important middle periods and to the early-old-age periods of life. It is our duty as a community to press forward to attain this. The medical profession can interpret the law, but it is for the whole people to obey the law or otherwise. We shall reap the consequences in either case.

Sunt qui volunt, et sunt qui nolunt.

The Law is great and greatly to be feared,
And had in reverence of all that live.
The Law obeyed shall health, wealth, pleasure give ;
The wise in all time have the Law revered.
And to the lowly hath the Law appeared
All-comprehensive in imperative ;
And round, complete and full, obligative ;
Yea, and in awful majesty ensphered.
Who set themselves above the Law, in pride
Or ignorance, the force of Law shall know:
Who break the Law, in pain and life-long woe,
Shall pay the penalty for Law defied.
They only who obey have freedom found,
Then free the most when seeming strongest bound.

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